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POLLUTION OF THE INTERSTATE WATERS OF THE MAHONING RIVER - AND ITS TRIBUTARIES. PROCEEDINGS OF CONFERENCE HELD AT YOUNGSTOWN, OHIO ON FEBRUARY 16-17, 1965. VOLUME 1

Public Health Service
Washington, D. C.

16 February 1965

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PROCEEDINGS

VOLUME 1

Youngstown

Conference

In the matter of Pollution of the Interstate Waters of the Mahoning River - and its Tributaries

February 16-17, 1965

U. S DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

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Springfield VA 22151

UNITED STATES PUBLIC HEALTH SERVICE

DIVISION OF WATER SUPPLY AND POLLUTION CONTROL

In re:

ENFORCEMENT CONFERENCE ON THE
MAHONING RIVER

Voyager Motor Inn
129 Market Street
Youngstown, Ohio
Tuesday, February 16,1965.

The above-entitled matter, pursuant to notice, at 9:35 a. m.

MURRAY STEIN, Chairman.

CONFEREES:

Leonard Weakley - Ohio River Valley Sanitation Commission
Edward Cleary - Ohio River Valley Water Sanitation Commission
Dr. Charles Wilbar - Ohio Water Pollution Control Board
Dr. E. W. Arnold - Ohio Sanitary Water Board
H. W. Poston - United States Department of Health, Education, and Welfare

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PROCEEDINGS

CHAIRMAN STEIN: The conference is open.

→ The report is on the

This conference, in the matter of pollution of the interstate waters of the Mahoning River and its tributaries involving the States of Ohio and Pennsylvania, the Ohio River Valley Water Sanitation Commission and Department of Health, Education and Welfare, is being held under the provisions of Section 8 of the Federal Water Pollution Control Act. This conference covers the Mahoning River and its tributaries from Warren through Youngstown, Ohio, across the Ohio-Pennsylvania state line to its mouth; the Shenango River from Jamestown, Pennsylvania, to its confluence with the Mahoning to form the Beaver River; and the Beaver from this confluence to Beaver Falls, Pennsylvania.

for 1965.

Under the provisions of the Act, the Secretary of Health, Education, and Welfare is required to call a conference of this type, when on the basis of reports, surveys or studies he has reason to believe that pollution of interstate waters subject to abatement under the Federal Act is occurring.

→ The purpose of the conference is to bring together the state and interstate water pollution control agencies, representatives of the Department of Health, Education, and Welfare, and other interested parties to review the existing situation, to appraise the progress which has → p. 4

been made, to lay basis for future action, and to give the states, localities, and industries an opportunity to take any remedial action which may be indicated under state and local law.

The conference technique is rather an old one. It is used informally by many state agencies in the normal conduct of their business in the field of water pollution control. The concept of the conference was proposed by the United States Supreme Court as long ago as 1921 in the famous case of New York against New Jersey involving interstate pollution.

I would like to quote from this court opinion:

"We cannot withhold the suggestion, inspired by the consideration of this case, that the grave problem of sewage disposal by the large and growing population living on the shores of New York Bay is one more likely to be wisely solved by cooperative study and by conference and mutual concession on the part of representatives of the states so vitally interested in it than by proceedings in any court however constituted."

We strongly support the conference technique and consider as successes those problems which are solved at the conference table rather than in court.

As specified in Section 8 of the Federal Water Pollution Control Act, the Secretary of Health, Education, and Welfare has notified the official state and interstate water pollution control agencies of this conference. These agencies are the Ohio Water Pollution Control Board, the Pennsylvania Sanitary Water Board, and the Ohio River Valley Water Sanitation Commission.

Ohio will be represented by Dr. Arnold, the health officer; Pennsylvania will be represented by Dr. Wilbar, the health officer of Pennsylvania; and ORSANCO will be represented by Mr. Leonard Weakley and Mr. Edward Cleary. Mr. Poston, on my right, of the Chicago Regional Office of the Department of Health, Education, and Welfare, has been designated as conferee for the Federal Government.

My name is Murray Stein. I am from Washington, D.C., headquarters of the Department of Health, Education, and Welfare, and I am a representative of Secretary Celebreeze.

The representatives of the official agencies are privileged to invite whomever they wish to participate in the conference. However, this a conference of the representatives of the state and interstate agencies and representatives of the Department of Health, Education, and Welfare, and these parties constitute the conferees.

Both the state and Federal Government has responsibilities in dealing with interstate water pollution control problems. The Federal Water Pollution Control Act states that the states have primary rights and responsibilities for taking action to abate and control interstate pollution. It has always been the policy of the Department of Health, Education, and Welfare to give full recognition to this traditional role of the states and to encourage them in these activities. At the same time, the Department of Health, Education, and Welfare is charged by law with its own specific responsibilities in connection with interstate pollution control problems.

The Federal Water Pollution Control Act provides that pollution of interstate waters, whether the matter causing or contributing to such pollution is discharged directly into such waters or reaches such waters after discharge into a tributary of such waters, which endangers the health or welfare of persons in a state other than that in which the discharges originate, is subject to abatement. The conference will be useful, we hope, in providing a clear picture of the problems, in delineating the progress which has already been accomplished, and in indicating what still needs to be done to correct the problem in these interstate waters.

All of the conferees will be called on to make statements. At the conclusion of such statements, the conferees will be given an opportunity to comment or ask questions. In the past, this procedure has proven effective in reaching equitable solutions. At the end of all the statements, we will have a discussion among the conferees and try to arrive at a basis of agreement on the facts of the situation and, if it warrants, at the end we will attempt to describe what basis of agreement we, the conferees, have arrived at.

Under Federal Law, the Secretary is required at the conclusion of the conference to prepare a summary of it which will be sent to all the conferees. The summary, according to law, must include the following points:

1. Occurrence of pollution of interstate waters subject to abatement under the Federal Act.

2. Adequacy of measures taken toward abatement of pollution; and

3. Nature of delays, if any, being encountered in abating the pollution.

I would suggest that the conference presentations and discussions be directed toward these points so that the Secretary may, in discharging his statutory obligations, prepare the most useful summary possible.

Subsequent to the holding of the conference, the Secretary of Health, Education, and Welfare is required to make recommendations for remedial action if such recommendations are indicated.

Now, a word about the procedure governing the conduct of the conference. A record and verbatim transcript will be made of the conference by Mr. Fowler. Mr Fowler is making this transcript for the purpose of aiding us in preparing a summary and also for providing the complete record of what is said here. We will make copies of the summary and transcript available to the official state water pollution control agencies of Ohio and Pennsylvania and the interstate commission. We have found that generally, for the purpose of maintaining relationships within a region or a state, that the people who wish transcripts should request them through their state or interstate agency rather than come directly to the Federal Government. The reason for this is that we would prefer people who are interested in the problem to follow their normal relations in dealing with the state or interstate agencies rather than the Federal Government in these matters when the conference has been concluded. We will be happy to make this material available to the agencies for this distribution.

I would suggest that all speakers and participants making statements, other than the conferees, come to the lectern and identify themselves for purposes of the record.

I would also like to request that if you have a prepared statement, that this be given to the reporter because, while I never met the gentleman before in my experience here, I know what a chore it is taking this down all day and it will facilitate matters for him if he can follow some of the statements in printed or typed form rather than have to take down every word verbatim.

At this time, I wonder if Mr. Sam Gould is here who, I understand, has a statement for Congressman Michael Kirwan. Mr. Gould.

A VOICE: I am sorry to report Mr. Gould is on his way and will be here in just a minute.

CHAIRMAN STEIN: I would suggest, in order to expedite things, we go ahead. Generally speaking, the protocol at the conference is to call on Congressional representatives first or government and, as I understand, Congressman Kirwan is the one who asked to speak. When Mr. Gould gets here, we will put him on.

Now, the conferees had a preliminary meeting in which the agenda was determined to the mutual satisfaction of all the conferees and, at that time, it was decided that we would call on Ohio first, Pennsylvania second, ORSANCO third, and the Federal Government last to make the presentations.

At this point, I would like to call on Dr. Arnold of Ohio. Dr. Arnold.

DR. ARNOLD: Thank you, Mr. Chairman. Fellow conferees, associates, friends: Ohio comes to this conference with the sincere hope that our discussions result in better understanding, improved cooperation, and truly responsible partnership in programs of water control.

We admit to both puzzlement and concern about the calling of this conference by officials of the Federal Government, and we feel that in all honesty we should explain our feelings on these matters. However, we do not intend to belabor these points.

Having accepted participation in this conference, it is our desire to throw as much light as possible on the problems of pollution in the Mahoning River and on the accomplishments toward abating that pollution. We believe these accomplishments have been significant and that they are deserving of praise rather than criticism.

With a presentation of factual information by our own staff in the Ohio Department of Health, by municipal officials and by industrial representatives we expect to demonstrate the following facts:

1. That tremendous strides have been made in pollution abatement on the Mahoning River in Ohio.

2. That a continuing program for further stream improvement is under way.

3. That today's Mahoning River is nothing like the Mahoning of a few years ago, which was admittedly at that time one of the worst polluted streams in the nation.

4. That Ohio has a high goal in water pollution

control and is working effectively toward this goal.

5. That Ohio has been cooperating with neighboring states in its stream clean-up program, and that Ohio's program has had the approval of these neighboring states.

Now, getting back to the subject of our concern and puzzlement at the calling of this conference -- we bring attention to the fact that Ohio is a member of an eight-state compact, formed nearly 16 years ago, for interstate cooperation in cleaning up the waters of the Ohio River and its tributaries. This regional organization, the Ohio River Valley Water Sanitation Commission -- better known as ORSANCO -- has achieved worldwide recognition for its accomplishments. It has given to this country and to other countries an ideal for a major watershed approach to pollution abatement. The State of Ohio, having the largest population and greatest area in this watershed, is a major partner in the compact. The award-winning accomplishments of ORSANCO could hardly have been achieved without the cooperation of Ohio. The Mahoning River is a tributary of the Ohio River and is a part of this watershed program. The improvement schedule on the Mahoning River has had the approval of ORSANCO.

Next, we would call attention to the fact that the Federal Government is represented on ORSANCO with three Commissioners, the same number as each of the states. We also point to the Federal Water Pollution Control Act which makes the express declaration that interstate action to abate pollution shall be encouraged and "shall not be displaced by Federal action."

These facts being true, we cannot understand why the Federal Government did not make use of its membership in ORSANCO to seek any information which it may hope to get at this conference today. All such information would have been easily available through ORSANCO.

We cannot understand why ORSANCO was not even consulted before the calling of this conference. We cannot understand why Ohio was not consulted. Ohio Department of Health Engineers and United States Public Health Engineers have been exchanging information freely for years. What is more significant, Federal engineers and Ohio engineers worked together in a specific survey of the Mahoning River in the early 1950's. It was on the basis of this survey that immediate goals were set for pollution abatement.

The accomplishments of the program as measured in actual water quality tests certainly have been no secret. One of the most critical sampling points on the Mahoning, just before the stream crosses the state line into Pennsylvania, has a robot monitor which was installed cooperatively by the Ohio Department of Health and the United States Geological Survey. The maintenance and reading of this device is under Federal surveillance.

It must be apparent that the Federal Government has been well informed about the Mahoning River. It has had continual access to reports on the Mahoning River cleanup.

Now we are suddenly brought into a conference on pollution of the Mahoning River by Federal action which implies by the nature of the call that health and welfare may be endangered and that some sort of emergency exists.

If an emergency existed, it was 10 years ago, and the Federal Government is considerably late. If an emergency existed, the Federal Government has been negligent in not making use of the forum available to it through ORSANCO, our interstate compact, of which it is a member. If an emergency existed, the Federal Government had the same rapid channels of communication with the Ohio Department of Health that are used in connection with communicable disease problems at all times. We have nothing but the friendliest relations between our Department and the United States Public Health Service.

In this case, however, what the Federal Government seems to have chosen, instead of reasonable approaches and contacts, is a cumbersome devise of the Federal Water Pollution Control Act by which at this late date the Federal Water Pollution Enforcement unit, no longer a part of the U.S. Public Health Service, may make itself a party to somebody else's accomplishments.

Let us talk now about these accomplishments. We shall summarize them briefly in this opening statement, which will be followed with more detailed reports by our state engineers, by municipal officials, and industrial representatives.

The Mahoning River is a relatively small stream but mighty in its capacity to provide for the development of a major industrial complex. That the stream once was used to the point of abuse cannot be denied. Representatives of the Ohio Department of Health described this stream as one of the worst in the State, if not one of the worst in the Nation, more than 10 years ago.

After joining ORSANCO in 1948, Ohio adopted a completely new and strongly effective Water Pollution Control Law in 1951. This law sets a high standard for pollution abatement. Accomplishments under this law have been considerable throughout the state -- briefly summarized in the figure of nearly a billion dollars worth of waste treatment facilities constructed in the last 12 years -- much more than in all the previous history of the state.

This law provides for an administrative and enforcement Water Pollution Control Board which functions in the Department of Health. This Board has the authority to set reasonable and practicable time schedules for accomplishing the goals of the law, and is charged with considering the total effects of its orders as they relate to benefits that may be derived. The Board considers physical, economic, social and political situations along with the technical and engineering problems.

It is recognized that the Mahoning River is essential to the economy of the area. Water usage in the area sometimes has reached 14 times the normal dry weather flow of the river. Without a useful Mahoning River, the industries would wither and the communities become ghost towns.

It is also recognized that a river has many uses and that all of these uses must be protected and preserved. Under its new Water Pollution Control Law, Ohio made an extensive survey of the Mahoning River in 1952, 1953 and 1954, taking into consideration all uses and also all abuses that would interfere with these uses. Engineers of the United States Public Health Service participated in this study. A report was published, setting forth guidelines for the pollution abatement program which has been carried out during the last 10 years.

The following primary needs and uses were set forth:

Above Milton Dam -- domestic water supply, agricultural and industrial purposes and recreation.

From Milton Dam to the corporate limits of the City of Warren -- agricultural and industrial purposes and recreation.

From the upstream corporate limits of Warren to the Pennsylvania-Ohio state line -- industrial purposes.

All tributaries to the Mahoning River -- domestic water supply, agricultural and industrial purposes and recreation.

At the Ohio-Pennsylvania state line -- water of such quality as not to be harmful or inimical to domestic water supply uses in Pennsylvania.

The policy of Ohio's Water Pollution Control Board is to require continuing progress on a schedule considered as reasonable. Several factors determine the reasonableness and order of priority of requirements for a given municipality or industry -- importance and degree of interference with water usage; magnitude of the project; technical knowledge of means for handling the project; economic feasibility; concurrent development of programs by area municipalities and industries.

Since waste treatment for most municipalities on the Mahoning was non-existent and since waste treatment by industry was minimal in 1951, the recommendations for improvement encompassed a very great program which has taxed the economy of the area and the ingenuity of municipal officials and industrial executives in devising means of accomplishment. The course of action has not been entirely smooth. It involved some enforcement proceedings by the Water Pollution Control Board of Ohio. It was delayed by some local taxpayer suits. It was even marked by a criminal investigation and imprisonment for one group of municipal officials who became involved in an unfortunate misuse of local anti-pollution funds. Despite these handicaps, the progress is such that the entire area can take pride.

We are now at a stage where the municipal sewage treatment program outlined 10 years ago is virtually accomplished -- 10 percent complete when the new Youngstown sewage treatment plant reaches full operation.

While some phases of the industrial program are not completed, a large portion of them have been accomplished. Emphasis has been given to elimination of those increments of waste which have the most deleterious effects on water quality requirements. These priority requirements have been met and will be detailed in the technical report of our engineers.

The industrial waste treatment goals not yet achieved have been placed on a definite time schedule with completion dates in the near future -- none more than two years away.

The State of Ohio now expects to make periodic re-evaluations of reasonable water uses and water quality requirements, in cooperation with the State of Pennsylvania and the Ohio River Valley Water Sanitation Commission, ORSANCO. The schedules of those discharging wastes -- municipalities, industries and other entities -- will be revised as needs indicate.

Ohio requires monitoring of pertinent stream quality data under its permit program for those discharging wastes into waters of the state. This is supplemented by a state-sponsored monitoring program conducted by water treatment plant operators. In addition, ORSANCO has a monitoring program on the Beaver River (into which the Mahoning flows in Pennsylvania). And Ohio has a U.S. Geological Survey automatic monitoring station on the Mahoning River at Lowellville near the Ohio-Pennsylvania state line. Data from all these points show progress in water quality improvement.

The points I have made here are going to be detailed by our engineers and by representatives of municipalities and industries who have been invited by us to be participants in this conference.

We in Ohio are proud of the accomplishments by the municipalities and industries of the Mahoning River Valley in combating water pollution. We frankly resent the affront to them which we believe has been implied by the calling of this conference.

Pollution control is being accomplished on this river in a reasonable and practical program which is little short of amazing when its pace is balanced against the size of the problem 10 years ago.

It is our feeling that the people of the Mahoning Valley should be praised rather than criticized.

We think the Mahoning Valley water pollution control program might truly serve as a model for other parts of the country with seriously polluted rivers. Perhaps the Federal Government's water pollution enforcement unit will be wise enough to recognize this. The Federal unit would then have gained a valuable lesson from this conference. It would have a practical guide for a pollution abatement program that works. It could take this guide to some of those areas of the country where no programs for pollution abatement exist at all.

Thank you.

CHAIRMAN STEIN: Thank you, Dr. Arnold.

... Applause ...

CHAIRMAN STEIN: I think we may withhold comment if we might since Mr. Gould is here, until Mr. Gould speaks. Mr. Gould, would you want to speak for Congressman Michael Kirwan?

MR. GOULD: Mr. Chairman, members

of the conference, ladies and gentlemen: My name is Sam Gould, Jr., I am the County Engineer and also the County Sanitary Engineer, and I have the unique distinction of reading a statement prepared by our Congressman, Michael J. Kirwan.

Gentlemen, I speak to you today as the member of Congress who has represented most of the district through which the Mahoning River flows and I represented it for almost 30 years. As such I believe I am as knowledgeable as any person with respect to the Mahoning River and the other sources of water supply, for whatever purpose they may be used, in this district. Nor do I think I am being immodest if I say that I have worked long and hard over the years, and that we have accomplished a great deal, on this matter of water sources and their conservation.

Permit me to make this observation, based on my own, long experience: what has been done with and to water in the Mahoning Valley is truly an outstanding example of what can be done when local people work with local -- and I include state in that term -- authorities on their problem.

You have already heard, or will hear, others even more experienced than I in the nuts and bolts work being done on the Mahoning recite in great detail just what it is that has been accomplished toward the solution of the problems of the Mahoning, whether these problems are real or imagined.

These men know whereof they speak. They are experts from industry and from the state authorities. If you get the impression that they are telling you that, working together, they have an adequate program for solving the problems of the Mahoning, and that, working together, they have accomplished a great deal in this direction, then I say to you now, I endorse their conclusions, for they are based on fact.

Now, I have heard the expression used hereabouts that the condition of the Mahoning must be that it will sustain life. Well, sustain whose life? People? Fish? If one means sustain the life of people, that is just what the Mahoning is doing now. It is now and always has been and, I trust, always will be, an industrial stream. Certainly, without it, there would be no economic life in the Mahoning Valley. There would be no roaring steel mills, nor humming-associated and supporting industry. I submit the Mahoning is doing a workhorse type of job in sustaining life right now.

So that leaves fish.

I have no wish to be cavalier about the interests of our sporting population when it comes to fishing. Being practical, I might just say that I recognize that fishermen vote, too, along with everybody else, including the steelworker and others employed in industry. I'm for fish, and lots of them, but in the right places. Certainly in the stretch of the Mahoning River where the steel mills are located isn't one of those places. Furthermore, the Youngstown district people who want to fish are certainly not deterred from the pursuit of their favorite hobby because there are no fish in the Mahoning River. Every fisherman hereabouts knows that there are many, many fine fishing sites in easy driving distance from Youngstown. Countless places, in fact, where the fishing is good, put there by the Federal Government that recognized the Mahoning as an industrial stream years ago, especially in war time.

I leave you with this thought: there was no doubt a day on the Mahoning when the Indians fished the stream in pristine cleanliness. I don't know how long ago that might have been. But I do know this. The Indians had no television to watch nor jet airplanes on which to ride. And I ask you now, who was better off, the Indians or you and I, here, today? If losing the fish in the industrialized stretch of the Mahoning was the penalty we had to pay, then I say and I think you will agree, it was a penalty well worth paying.

Once again, may I state to you, that it is my considered judgment that, first local and state authorities are doing the job that needs to be done on the Mahoning and, second, that the job is being done, as the record of accomplishment is well documented. We are doing as much, or more, than any district in the country to accomplish this purpose.

Furthermore, dredging of the Mahoning River is inevitable some day and this, too, will further improve its condition. Steel plants have already started to do this on their own.

Thank you very much.

CHAIRMAN STEIN: Thank you, Mr. Gould.

Are there any comments on Mr. Gould's statement? If not, may we go back to Dr. Arnold and see if there are any comments on your statement. Are there any from ORSANCO, Pennsylvania?

MR. POSTON: I might ask to do a little clarification here, if I might. Dr. Arnold talked about the understanding of the reasons for this conference and I might read out of the Federal Water Pollution Control Act where it says, "The Secretary shall also call such a conference whenever, on the basis of reports, surveys, or studies, he has reason to believe that any pollution referred to in Subsection (a) and endangering the health or welfare of persons in a state other than that in which the discharge or discharges originates is occurring."

This, it says, "He shall call this conference," and this, I think, he has done. I would like to ask, if

I may, one question of Dr. Arnold. I think we probably will answer it later, and that is: Is the Mahoning River polluted?

DR. ARNOLD: I don't know whether you referred the question to me but I think in the presentation of our technical appraisal of this river, this question will be answered, and if it is appropriate now, I would like to call --

CHAIRMAN STEIN: Well, let's see if there are any more comments. If not, I would like to say, Dr. Arnold, you made one remark to the effect that the enforcement group was no longer in the PHS. I don't worry about these remarks on the record except we may have a payroll analyst or clerk read the record sometime and I would like to keep my pay check coming in. This is still part of PHS and this is where we get our money from. And I would not like to stand uncorrected in the record. By the way, would you people want to find seats back there? You may be more comfortable.

The second point I would like to make of this comes back to Mr. Poston's remark and I think, of course, you know that Shakespeare said a lot of things better than any of us. But I wonder if directed at the end, the conference might not show what the main thrust of your statement is, that "Me thinks you may protest too much," that the calling of this conference is an implied criticism, expressed or implied, of anything that Ohio has done.

No one has indicated that this is an implied criticism except the first I have heard of that has been in your statement three or four times. I think the calling of a conference, which is mandatory under the Federal Act, is just a procedure that the Secretary is charged with. I am sure that the Secretary does not mean any criticism, expressed, implied, or otherwise, of any state or interstate agency.

Dr. Arnold, would you go on?

DR. ARNOLD: The first I heard of this conference was when I received a letter from the Secretary dated the 15th of December. There had been no previous communications with the Ohio Department of Health or with ORSANCO for the need of any such conference regarding the Mahoning River. Sometime after that, we had requests from the Public Health Service for cer~~tain i~~nformation that we could make available to them and for certain information that we could not make available to them. There was a great scurrying about by the Public Health Service after the date of calling this conference to get information and data of water quality to support the need for this conference. This is to me a little difficult to understand.

In the report that the Federal Government has made available to you, you will find that some of the data presented in that was secured during the month of January, a month or a month and a half after this conference had already been called. The Ohio Department of Health, in the last several years, had no complaint from the State of Pennsylvania protesting that the Mahoning River was endangering the health or welfare of the people of Pennsylvania.

CHAIRMAN STEIN: I believe the facts might come out and Mr. Poston may have a comment on this and, of course, we will call on all the conferees. But again, at this point, I want to say that assuming what I have said is entirely valid, I don't see how this adds up to any criticism expressed or implied of Ohio. And this was the only thing that I address myself to. Nor is it any criticism of Pennsylvania or ORSANCO and I think nowhere have we indicated that. Mr. Poston, do you want to comment on this or not?

MR. POSTON: I might comment to the effect that it is true that this report, the blue report that we have out on the table here today, and we will present a summation of it later, was prepared after the first of the year. We are attempting to make this the most fruitful and the best possible conference that we can, and for this purpose we would like to have the latest known data and for this purpose we went to the State Health Department whom we ordinarily work with and asked for the latest data; and this is the purpose behind our request. We further went to industry and, in some two or three cases, we had difficulties obtaining information on effluents - effluents which we consider is a source of information to completely evaluate the conditions in the Mahoning River. I think that's all I have to comment on.

CHAIRMAN STEIN: Do you want to comment again?

DR. ARNOLD: No, I have no further comments.

CHAIRMAN STEIN: Do you wish to go on with your presentation, Dr. Arnold?

DR. ARNOLD: Yes. I would like to now present Mr. George Eagle, Chief Engineer of the Ohio Department of Health.

MR. EAGLE: Mr. Chairman, conferees, ladies and gentlemen, my name is George H. Eagle. I am the Chief Engineer of the Ohio Department of Health. I wish to supplement Dr. Arnold's statement with engineering data and facts obtained by the Ohio Department of Health and others over the past 12 years. But, first, before I do this, I want to assure the participants invited here by the State of Ohio that despite the comments of some, this is not an enforcement conference.

Obviously, the Secretary of Health, Education, and

Welfare has been given advice by someone that the health or welfare of persons in Pennsylvania is endangered. This conference is to determine whether this is so. The conference also is to determine whether there is interstate pollution, whether there is an adequate program to abate pollution and what the delays are, if any, in abating pollution.

It should be understood by all those reporting today that their programs are not on trial. The Federal agency report states there is evidence of interstate pollution which brings it under the Federal Control Act. Granted there is pollution. If there were no pollution in the Mahoning, there would be no construction of waste control facilities now under way. However, the holding of this conference does not remove any of the authority of the states or ORSANCO. Nor does it give the Federal Government any enforcement authority. This should be well understood.

When this conference was called by the Secretary, he described it as a conference, not an enforcement conference. It is true that the calling of the conference is in the sectior of the Act which includes enforcement, but the law does not describe this as an enforcement action. This is stressed not only to remove any concerns of those providing reports for the consideration of the conference, but also to remove any ideas that this Federally-called conference automatically means that the states and ORSANCO are inadequate or ineffective, or have not been alert to the health or welfare of the citizens

The national emphasis on pollution abatement is recognition that better water quality benefits the general welfare. Providing water adequate in quality for the best interests of the people is the objective of pollution control. Towards that end, our pollution control program is now in full swing in approaching accomplishment.

The matter of health is specific. Health has concerned state and Federal agencies long before there was emphasis on pollution control. Attention to water quality in the United States has been so effective that water can be drunk safely in almost all of our communities. There may be problems in taste, odor or color, but safety is seldom the question. At no time has there been any intimation from either state or Federal authorities of any threat to health of citizens in Pennsylvania. The Federal report on the Mahoning has been construed by some citizens and legislators to say that the condition of Beaver Falls water can at times be a threat to health. A closer review of the report shows this would occur only if the water treatment facilities were out of operation. This conclusion can be drawn for nearly every water treatment plant in the Nation. Such obvious statements when offered by a Federal agency may sound profound, but neither the State of Pennsylvania nor the Beaver Falls Water Company would, I am sure, permit untreated water to be delivered to the citizens of Beaver Falls.

Now, I wish to report the facts on the Mahoning River and the status of treatment facilities in the basin. First, the water quality data.

STREAM WATER QUALITY

The proof of successful pollution abatement is improved river water quality. The objective of Ohio's water pollution control program is the upgrading and maintaining of stream water quality for necessary and legitimate water uses. Until two years ago the U. S. Geological Survey monitoring station at Lowellville was sufficient to record changes in quality. By that time many of the municipalities and industries had completed construction of their treatment plants. With this milestone there was a need to measure improvement and to determine the effect and sources of the remaining problems. To do this, Ohio started a monitoring program at key points along the river. This program is in addition to the U.S.G.S. control station at Lowellville near the Pennsylvania-Ohio state line.

The monitoring is particularly directed towards determining the success of the program to abate these sources of pollution:

1. Inadequately treated sewage.
2. Slug discharges of organic wastes which

cause objectionable tastes and odors at Beaver Falls.

3. Discharges of cyanides and heavy metals from metal finishing which would be toxic to aquatic life and interrupt stream purification.

4. Slug discharges of acid.

5. Discharge of solids.

6. Discharge of oils.

The two years of data from this monitoring -- 1963 and 1964 - are most encouraging. Not only is there evidence that objectives are approaching accomplishment, there is evidence that the treatment plants are adequate for the job. The years 1963-1964 were dry years, among the lowest on record. These drought flows were lower than those used to compute treatment needs.

All recognize the Mahoning River is a low-flow river. During the 1963-64 years the yearly average flow was 40 percent below that of the average for the past 22 years. This meant that pollution conditions were measured at their worst. It has also provided the opportunity to anticipate the benefits which will result with the construction program under way this year and scheduled for 1965-66. The outlook is good.

I would like to briefly review with you the progress to date in accomplishing the control of the wastes just mentioned. In doing this I will describe the treatment facilities provided and the resultant water quality as measured by several critical criteria of quality. The point in the river used as the gauge is Lowellville. This station is just upstream from the Pennsylvania-Ohio state line. It is also just downstream from the Youngstown complex.

Inadequately Treated Sewage.

Sewage includes solids which settle in the river to form putrescible sludge banks. Sewage also uses the oxygen in the river and carries heavy bacterial loads.

The objectives are to remove the solids and reduce the oxygen requirements so that there will be sufficient oxygen in the river to support aquatic life and to maintain the self-purification of the river. Another objective is to keep the bacterial quality below any harmful levels.

In 1952 only three communities in the basin had sewage treatment plants. By the end of 1964 every community with a recognized system of sanitary sewers had sewage treatment facilities. The largest city, Youngstown, after overcoming many obstacles has completed its treatment plant. The interceptor sewers are completed but three river crossings are needed to get all the sewage to the plant. These are under construction now and will be completed early this summer.

Until this sewage is connected to the treatment plant there will obviously be adverse effects in and below Youngstown. The monitoring data agree with this. However, these data also show the improvement resulting from the operation of the other treatment plants, namely, Warren, Niles, Girard, Campbell, and Struthers, and the surrounding communities.

As will be reported later, most of the industries discharged their untreated sewage to the river in 1954. Now, all industries have connected their sewage to the municipal systems or are in the process of completing the construction for connection.

In 1954 the river frequently approached zero dissolved oxygen below Warren and below Youngstown. In 1964 there was dissolved oxygen below Warren at all times and 78 per cent of the time it was above our minimum requirement of 3.0 p.p.m. At Lowellville, very low dissolved oxygen was measured at times but 75 per cent of the time the level was at or above the minimum -- even at the low flows.

In our opinion, the treatment of all of Youngstown's sewage this summer will assure the attainment of the dissolved oxygen objective of 3.0 p.p.m. It will also remove the sewage sludge banks and it will reduce the bacteria counts.

Discharge of Cyanides and Heavy Metals from Metal Finishing.

In 1954 the only treatment facilities for cyanides and heavy metals were in the plants in the upper river above Warren.

In 1964 all discharges of these materials are adequately treated. Many discharges have been completely eliminated.

The monitor data shows the concentration of heavy metals and cyanides in the river to be well below the limit established by the Public Health Service Drinking Water Standards.

Slug Discharges of Acid.

In 1954 there were no adequate controls on spent acid discharges. The practice was to pull a plug and dump a tank. The river below Warren and below Youngstown was frequently acid for hours at a time.

The Aquatic-Life Committee of ORSANCO indicates that the hydrogen-ion concentration probably does not effect fish adversely between pH 5.0 and pH 9.0. To maintain productivity of water for aquatic life, a pH range of 6.5-8.5 is recommended. In 1954 pH values as low as 2.5 were observed.

Several control measures have been instituted to improve this condition, these include neutralization, haulage of strong pickle liquors and controlled discharge.

During 1954, the lowest pH value observed was 3.5

In the most critical section of the stream, pH values of 5.0 or greater was observed 88 percent of the time. At Lowellville, pH values of 5.0 or greater were observed 97 percent of the time and values of 6.5 or greater were observed 85 percent of the time.

Further improvement is required by the Ohio Water Pollution Control Board. The report by the representative of the Steel Industry will further describe proposals.

Discharge of Solids.

Part of the solids problem was sewage. I have reported that this program will be completed this summer. Then there were solids from coal washing, sand and gravel pits and clay mining. All of these are now treated.

The largest industrial source of solids on the river is the steel industry. A detailed report on this program will follow but it should be noted here that the provision for controls to prevent pollution from this source will be virtually completed by 1966. Until then, there will be high concentrations at times at the state line.

Discharge of Oils.

Oils are now discharged to the river from some municipal and industrial sewers.

Connection of municipal sewers to treatment plants will control the municipal problem.

How oil losses from the steel industry are being controlled is part of the industry story. The program is related to the solids treatment and will be virtually complete by 1966.

Sulfates.

Sulfates originate from geological deposits, strip mine operations, industrial chemicals and fertilizers. There are a number of strip mine operations and some abandoned deep mines in the basin which contribute significant sulfates. This is evidenced by concentrations above 100 p.p.m. over 50 percent of the time at Pricetown above Warren. This is the situation upstream above the steel mills.

Later, a representative of the coal industry will present a detailed report describing accomplishments and proposed controls.

At Lowellville, sulfate concentrations in the river exceeded 250 p.p.m., the PHS Drinking Water Standard, 48 percent of the time. Elimination of acid iron discharges from the steel plants will, we believe, reduce the sulfate concentrations to acceptable limits.

Alkalinity.

The presence of some alkalinity is considered beneficial to most water uses. The Mahoning River has a very low natural alkalinity. In 1952, oftentimes, there was no alkalinity in critical stretches of the river below Warren. In 1964, the alkalinity in the river at Lowellville was above 25 p.p.m., 70 percent of the time. At no time in 1964 was the alkalinity zero.

Tastes and Odors.

Studies conducted on the Mahoning River showed there is little correlation between phenol concentration and chemical and medicinal tastes at the Beaver Falls water plant. There was, however, a correlation between such tastes and the occurrence of cleanout of sumps, cleanout of tank bottoms and pipe line breaks. This information explained why there were problems at the Beaver Falls waterworks even after the coke plants, the primary source of phenols, installed closed systems to prevent waste discharges. The companies have maintained these closed systems.

As sources of difficulties were determined, controls were instituted to prevent such discharges to the river. Improvement in quality at Beaver Falls water intake as evidenced by the decrease in number of occurrences of chemical odors is proof that the approach is effective. From 1954 to 1960, Beaver Falls had chemical tastes from 22 to 47 days a year. In 1963, there were four days and only five days in 1964. A surveillance program has been instituted to locate residual causes.

While phenol determinations do not tell the whole taste and odor story, I wish to point out that there has been a significant reduction in phenol concentrations in the

the Mahoning River at the state line. What the limit should be in view of recent observations, or in fact, if there should be any limit at all, is not known at this time. Further observations and studies are being made in this regard.

Summary.

As a brief summary of meeting water quality objectives at the state line in 1954, I offer the following data:

Dissolved oxygen -- not less than 3 p.p.m. -- 75 percent of the time pH -- between 5 and 9 -- 97 percent of the time.

Alkalinity -- not less than 25 p.p.m. -- 70 percent of the time.

Sulfates -- not more than 250 p.p.m. -- 52 percent of the time.

Total Iron -- not more than 5 p.p.m. -- 54 percent of the time.

Temperature -- not greater than 93 degrees F.-- 87 percent of the time.

With two possible exceptions, the program now under way is expected to meet these objectives, 100 percent of the time, by the end of 1966. These exceptions are possible:

(1) Temperature.

This river is used primarily for cooling. A new reservoir -- the West Branch -- will be in operation in 1966. This will reduce the high temperatures but the final results depend on the production in the Valley.

(2) Color.

There is a residual color problem from some of the waste treatment. The very large volumes of water involved prevent any specific requirement. When the present program is completed, the importance of color will be determined.

Details of the results of the monitoring programs are presented in charts and tables in the appendix.

TREATMENT FACILITIES

I have discussed the quality of the water in the Mahoning River. Now, I am going to give you a general picture of the treatment facilities that have been constructed over the past 12 years. These have contributed to the improvement of the stream quality. A detailed listing of the facilities are included in the appendices of this report.

First, I would like to tell you what the municipalities and communities have done.

Municipal and Community Wastes.

With the completion of construction of the sewage treatment plant for the City of Youngstown this summer, 100 percent of the sewered population of the basin will be provided with sewage treatment facilities. Also this summer, optimum treatment with disinfection will be provided for the first time. The tremendous progress which has been made in this basin can be seen from the charts. In 1952, only 58,000 persons or about 14 percent of the population of the basin were provided with sewage treatment facilities. In contrast, as shown by the overlay, all of the incorporated areas, plus additional built-up areas, of the basin are now served by sewage treatment facilities. This has been accomplished in spite of actual and threatened litigation.

This program has cost the citizens of the Mahoning Valley over $22,000,000. This means it has cost each person, each man, woman and child, over $100,000 apiece, to clean up the domestic sewage in the streams in the basin. Federal funds totaling about $2,500,000 assisted in the financing of the various projects.

The water quality data are showing that these sewage treatment plants are adequate -- they are protecting the uses of the river and they are cleaning up the river.

The municipal systems, in addition to collecting and treating the domestic sewage, are serving a number of industries. Four of these which were problems -- a tannery, two meat packing plants and a tar plant -- are connected or are in the process of being connected to the public sewage systems.

What the Industries Have Done.

There are seven organic industrial waste discharges which have their own treatment programs. These include two dairy plants, four meat packing plants and a tar plant. One of these, a dairy plant, is under board action to enlarge facilities.

There are three coke plants on the Mahoning River, all of which had organic waste discharges in 1954. By 1964, the installation of closed systems had eliminated the normal discharge. In addition, all known possibilities of cleanouts had been eliminated and changes were made in the plants to minimize losses from breaks or leaks.

Five companies with fly ash, several coal washing operations and a number of gravel and sand and clay plants were sources of discharges of solids in 1954. All have adequate settling basins now to keep the solids out of the river.

There are eight plants in the valley which do metal finishing. All of these plants now have treatment facilities to destroy cyanides and prevent metals from going to the river.

There are 22 plants along the Mahoning which use acid solutions for cleaning steel. In 1954, all discharged the spent acid to the river by dumping tanks. That practice has ceased except for two companies where control facilities are now under construction.

Of the 22 plants, 13 now provide neutralization or haul the acid away. Other than the two plants just mentioned, the rest provide controls on the discharge which have resulted in improving river quality. There is still a problem of iron salts to be resolved. The recent changes in pickling practice, however, offer promise of an answer to this.

There are several programs under way for dredging of iron deposits -- mill scale and flue dust -- from the river bottom. This accumulation has developed over many years and represents the loss of iron oxide from blast furnaces and rolling mills. Since 1954 this operating loss has been changing. Large settling basins have been constructed on a continuing schedule for all new mills and where modification of existing facilities was not feasible. The details of this program of progress will be provided by a representative of the steel industry.

However, it should be noted that the Ohio policy has been to require construction of adequate facilities for all new mills and a continuing program for constructing adequate facilities for existing operations.

With the construction to date and now under way or scheduled for completion in 1966, this problem of solids -- and the oils now lost from these mills -- will be virtually completed.

There are 16 blast furnaces in the area. By 1966 all will have adequate treatment.

In summary, and as you will note from the chart, the industrial wastes score in the Mahoning Valley is as follows:

Industries with facilities meeting current water quality objectives, total of 32 or 70 percent.

Industries having additional facilities under construction, total of 6 or 13 percent.

Industries where additional facilities are needed, total of 8 or 17 percent.

In view of the many problems we think this score is excellent.

CONCLUSIONS

In conclusion, I wish to re-emphasize the following facts:

1. With the completion of the Youngstown sewage treatment program this summer, all of the domestic sewage in the Mahoning River basin will be treated, and by the end of 1966 the industrial waste treatment program will be in compliance with Ohio's requirements, except for acid. The steel industry is now evaluating new pickling processes and will present a plan and schedule to the Ohio Water Pollution Control Board in the near future, for eliminating the acid problem in the river.

2. By the end of 1966, the water quality objective in the Mahoning River at the state line will be met 100 percent of the time. The objectives established by Ohio concurred in by Pennsylvania and ORSANCO are based on meeting the Public Health Service Drinking Water Standards at the Beaver Falls waterworks intake.

3. Ohio's pollution abatement program has the active support and cooperation of the public officials and industries in the basin. Ohio and Pennsylvania agreed several years ago on the priority of water uses to be protected in the various reaches of the Mahoning River, and the Ohio Water Pollution Control Board focused attention on those increments of waste treatment of major importance to such water uses.

4. Ohio, in cooperation with the U.S. Geological Survey, ORSANCO and the municipalities and industries, has established an extensive stream monitoring program on the Mahoning River for continuous surveillance and review of the treatment programs. Changes and improvements are and will continue to be required as river conditions dictate, and finally;

5. Ohio recognizes a responsibility to the Federal Government, to ORSANCO, to the State of Pennsylvania, and to ourselves, and we take considerable pride in our accomplishments. True, conditions in the Mahoning River have been bad

and some pollution still exists. However, great progress has been made, is being made, and will continue to be made in cleaning up the river. No, Ohio has not been lax in enforcement of the water pollution control laws.

Thank you.

... Applause ...

CHAIRMAN STEIN: Do you want the charts and records to appear in the record?

MR. EAGLE: Yes.

CHAIRMAN STEIN: With no objection, that will be done.

TABLE NO. 1(a)

STREAM WATER QUALITY - 1963

MAHONING RIVER BASIN
MAHONING RIVER AT PRICETOWN
(Ohltown Road Bridge)

Date Sampled	Flow* c.f.s.	Temp. °F.	D.O. mg/l	Phenol p.p.b.	pH	Total Alkalinity mg/l	Total Acidity mg/l	Conductivity µmhos/cm	Total** Iron mg/l	Ferrous** Iron mg/l	Chlorides mg/l	Sulfates mg/l
1/6/63	54	36	11.3		7.2	91	-	538	0.13		20	
1/8	52	33	10.7		7.3	101	-	640	0.14		20	
1/12	52	38	11.0		8.0	96	-	530	0.2		23	
1/15	39	32	13.4		7.7	88	-	500	0.39		23	
1/17	37	36	9.5		7.4	103	-	500	0.4		28	
1/31	94	37	8.0		7.4	101	-	600	0.4		34	
2/3	76	36	11.3		7.6	105	-	660	0.3		31	
2/10	31	36	11.0	0.0	7.7	107	-	680	0.4	0.4	34	
2/19	76	35	11.0	1.0	7.4	116	-	680	0.3	0.2	34	
2/25	64	32	11.0	0.0	7.2	110	-	620	0.2	0.2	40	180
2/26	57	32	11.3	9.3	7.5	103	-	670	0.4	0.3	39	200
3/11	24	35	12.8	0.40	6.9	30	-	230	0.8	0.8	16	36
3/19	31	40	10.7	1.60	6.6	67	-	480	1.3	0.9	20	83
3/25	788	40	10.7	2.70	6.8	56	-	390	0.6	0.51	22	75
3/30	578	46	10.4	0.13	7.0	43	-	330	0.7	0.4	17	60.0
4/4	77	48	10.4	4.9	7.6	46	-	300	0.82	0.73	15	60.0
4/16	98	52	11.0	9.30	7.2	43	-	260	0.5	0.3	15	56.7
4/22	55	52	9.5	3.67	7.4	45	-	310	0.2	0.2	15	60.0
4/29	55	56	9.2	11.9	8.3	53	-	330	0.3	0.2	15	64.4
5/5	57	58	9.5	2.87	7.3	45	-	350	0.3	0.3	15	58.4
5/9	142	65	9.2	5.17	7.3	38	-	310	0.2	0.2	16	63.4
5/17	160	60	10.1	12.62	7.4	42	-	320	0.2	0.2	14	66.7
5/23	162	59	9.2	10.33	6.8	46	-	320	0.3	0.2	14	70.0
5/24	162	60	9.8	8.04	7.1	48	-	320	0.2	0.2	16	73.4

TABLE NO. 1(a)

MAHONING RIVER AT PRICETOWN
(Ohltown Road Bridge) Cont'd

Date Sampled	Flow* c.f.s.	Temp. °F.	D.O. mg/l	Phenol p.p.b.	pH	Total Alkalinity mg/l	Total Acitity mg/l	Con-ductivity μmhos/cm	Total** Iron mg/l	Ferrous** Iron mg/l	Chlorides mg/l	Sulfates mg/l
6/6	184	69	8.6	7.78	7.2	45	-	350	0.6	0.4	20	66.7
6/10	199	72	8.2	7.43	7.1	75	-	360	0.3	0.2	20	63.3
6/22	197	69	8.3	2.3	7.8	48	-	350	0.2	0.2	16	78.4
6/29	215	73	7.2	10.35	7.4	49	-	340	0.4	0.2	19	67.4
7/5	215		8.3	8.7	7.1	48	-	350	0.2	0.2	20	83.4
7/16	246	73		5.51	7.0	49	-	380	0.3	0.3	18	78.4
7/22	244	74	7.8	0.0	7.4	46	-	390	0.2	0.2	19	83.4
7/28	241	78	7.8	13.78	7.4	49	-	380	0.2	0.2	19	78.3
7/31	236	68	7.6	10.33	6.7	54	-	380	0.2	0.2	17	90.0
8/13	227	75	8.0	4.82	7.1	56	-	380	0.2	0.1	17	71.7
8/16	227	73	8.3	1.26	7.3	55	-	380	0.2	0.2	17	90.0
8/26	227	72	8.3	1.15	7.5	51	-	390	0.2	0.2	18	83.4
9/2	222	72	8.0	12.63	7.4	56	-	400	0.2	0.2	19	83.4
9/9	208	71	8.3	6.89	7.5	57	-	390	0.1	0.1	20	86.7
9/22	184	66	9.2	0.00	7.5	62	-	430	0.2	0.2	19	93.4
9/30	171	65	8.1	8.04	8.0	59	-	450	0.2	0.2	19	86.7
10/6	162	59	8.9	4.48	7.8	65	-	450	0.3	0.3	23	90.0
10/14	148	63	8.6	0.00	7.6	66	-	460	0.2	0.2	24	83.4
10/27	111	65	8.9	0.00	7.7	73	-	460	0.2	0.2	22	100.0
10/29	111	60	8.3		7.3	70	-	450	0.3	0.3	23	93.4
11/11	78	51	9.2	0.00	7.1	72	-	480	0.9	0.9	28	100.0
11/19	92	48	10.1	0.00	7.6	70	-	480	0.2	0.2	24	113.4
11/21	92	47	10.4	0.0	7.4	67	-	490	0.2	0.2	23	111.7
11/22	92	50	10.7	0.0	8.0	73	-	490	0.2	0.2	22	103.4
11/29	90	49	10.1	4.8	7.3	71	-	470	0.1	0.1	24	125.0
12/16	64	33	11.9	0.0	7.8	67	-	470	0.3	0.3	25	156.7
12/29	67	34	11.0	4.8	7.2	80	-	550	0.2	0.2	30	116.7
12/30	64	35	11.3	0.0	6.3	83	-	560	0.2	0.1	29	125.0

TABLE NO. 1(b)

STREAM WATER QUALITY - 1964

MAHONING RIVER BASIN

MAHONING RIVER AT PRICETOWN
(Bridge at Ohltown Rd.)

Date Sampled	Flow* c.f.s.	Temp. °F.	D.O. mg/1	Phenol p.p.b.	pH	Total Alkalinity mg/1	Total Acidity mg/1	Con-ductivity μmhos/cm	Total** Iron mg/1	Ferrous** Iron mg/1	Chlorides mg/1	Sulfates mg/1
1/5/64	63	39	11.3	0.0	8.5	86	-	[illegible]	1.5	0.3	33	120
1/8	51	36	14.0	7.1	7.0	87	-	590	0.4	0.3	33	177
1/18	50	39	10.7	0.0	7.0	95	-	670	0.5	0.4	42	160
1/26	35	37	12.0	0.0	7.8	94	-	620	0.5	0.4	39	180
2/2/64	35	34	13.0	0.0	7.5	93	-	630	0.5	0.3	40	187
2/12/64	64	37	11.6	0.0	7.3	88	-	570	0.4	0.4	41	190
2/18/64	64	39	11.0	0.0	7.4	85	-	620	0.3	0.2	38	217
2/24	70	38	11.9	0.0	7.0	89	-	650	0.3	0.2	38	227
2/29	85	39	11.6	0.0	7.3	87	-	650	0.6	0.6	41	200
3/3/64	42	47	11.9	0.0	7.6	82	8	640	0.6	0.5	30	177
3/14	840	40	10.7	0.0	7.4	45	6	390	0.4	0.4	40	77
3/20	693	42	10.4	0.0	7.4	53	2	380	1.2	0.6	23	90
3/30	78	42	10.7	0.0	6.5	44	30	330	1.0	0.6	19	93
3/28	201	43	10.1	0.0	7.4	52	2	305	1.4	0.6	20	75
4/18/64	154	50	9.8	0.0	7.6	66	8	350	1.1	0.6	23	79
4/21	166	56	7.4	0.0	7.4	42	13	290	0.5	0.1	21	48
4/26	1540	57	9.8	0.0	7.8	40	4	290	0.5	0.2	19	68
4/30	510	58	9.8	0.0	7.2	38	3	290	0.5	0.4	17	90
5/7/64	136	70	9.5	0.0	8.2	42	0.5	310	0.3	0.0	19	80
5/17	56	67	8.0	0.0	7.9	47	1	325	0.6	0.4	18	78
5/31	175	66	7.8	0.0	7.7	46	4	315	0.8	0.6	20	75

TABLE NO. 1(b)

MAHONING RIVER AT PRICETOWN

(Bridge at Ohltown Rd. Cont'd.)

Date Sampled	Flow* c.f.s.	Temp. °F.	D.O. mg/1	Phenol p.p.b.	pH	Total Alkalinity mg/1	Total Acidity mg/1	Conductivity μ mhos/cm	Total** Iron mg/1	Ferrous** Iron mg/1	Chlorides mg/1	Sulfates mg/1
6/6/64	184	69	8.3	0.0	7.4	45	2.5	305	0.6	0.4	21	82
6/11	184	69	7.4	0.0	7.5	51	5	305	0.3	0.0	18	83
6/24	184	75	7.2	0.0	7.6	50	6	340	0.1	0.0	18	82
6/27	171	75	7.2	0.0	7.8	50	2	330	0.1	0.0	18	80
7/8/64	206	73	7.8	0.0	7.4	55	5.5	300	0.2	0.0	21	73
7/16	188	69	8.3	0.0	7.6	56	8	360	0.0	0.0	21	72
7/26	206	76	7.0	0.0	7.7	60	8	330	0.4	0.1	21	75
7/28	201	78	7.0	0.0	7.7	62	6	360	0.1	0.0	21	75
7/31	206	76	7.6	0.0	7.6	56	6	360	0.5	0.4	20	123
8/4/64	195	75	9.0	0.0	7.0	65	14	350	0.5	0.2	21	107
8/14	208	73	7.8	0.0	7.4	68	7	320	0.4	0.3	23	107
8/22	217	72	8.9	0.0	8.0	83	6	370	0.3	0.3	20	117
8/30	201	75	8.6	0.0	7.5	68	7	350	0.4	0.3	21	127
9/10/64	201	79	7.6	0.0	7.9	80	11	400	0.4	0.2	20	120
9/15	199	61	7.8	0.0	7.8	72	5	410	0.3	0.3	22	120
9/25	162	64	8.3	-	7.6	76	7	408	0.4	0.3	21	140
9/29	160	63	8.6	0.0	7.7	88	7	400	0.1	0.0	20	117
10/2/64	Data	65	8.3	0.0	7.9	75	4	430	0.3	0.3	19	88
10/6	Not	-	8.6	0.0	7.7	80	3	410	0.2	0.2	20	107
10/23	Available	51	8.6	0.0	7.8	70	4	425	0.2	0.2	20	133
10/27	"	54	8.9	0.0	8.2	85	2	420	0.2	0.2	20	117
10/30	"	52	8.9	0.0	7.7	84	8	430	0.1	0.1	29	130
11/6	"	52	9.8	0.0	7.7	86	6	420	0.2	0.2	21	143
11/12	"	59	8.6	0.0	7.6	86	10	430	0.2	0.1	24	130
11/20	"	47	9.2	0.0	7.6	85	6	430	0.2	0.1	22	123
11/24	"	42	10.7	0.0	7.6	71	10	420	0.1	0.1	21	127
5/11	"	69	8.9	0.0	7.9	43	0.5	295	1.0	0.7	20	80
12/4	"	39	10.7	0.0	7.5	95	8	435	0.4	.3	24	130
12/11	"	37	10.7	0.0	7.7	84	4	440	0.2	.1	25	-
12/14	"	37	11.0	0.0	7.8	103	5	390	0.8	0.2	25	-
12/23	"	36	11.3	0.0	7.9	89	5	435	.2	-	35	-
12/29	"	38	11.3	0.0	7.2	86	9	430	0.4	0.2	24	-

TABLE NO. 2(a)

MAHONING RIVER SURVEY - 1963

MAHONING RIVER AT LEAVITTSBURG
(U.S. Rt. 422)

Date Sampled	Flow* c.f.s.	Temp. °F.	D.O. mg/1	Phenol p.p.b.	pH	Total Alkalinity mg/1	Total Acidity mg/1	Con-ductivity µmhos/cm	Total** Iron mg/1	Ferrous** Iron mg/1	Chlorides mg/1	Sulfates mg/1
1/6/63	108	33	11.6		7.6	118	-	584	0.17		23	
1/8/63	112	32	10.7		7.3	127	-	600	0.17		22	
1/12/63	300	34	11.3		8.0	113	-	550	0.41		26	
1/15/63	200	31	11.6		7.7	8	-	430	0.66		26	
1/17/63	119	34	9.8		7.4	68	-	470	0.6		35	
1/31/63	120	33	8.6		7.6	125		620	0.6		33	
2/3/63	110	31	10.7		7.7	121	-	620	0.3		28	
2/10/63	95	33	11.0	0.0	7.7	124	-	560	0.4	0.4	35	
2/19/63	140	34	10.7	10.14	7.6	131	-	650	0.3	0.2	38	
2/25/63	110	32	11.0	0.0	7.5	120	-	550	0.2	0.2	38	130
2/26/63	110	31	11.0	1.4	7.8	120	-	610	0.4	0.4	40	150
3/11/63	990	39	12.6	0.33	7.1	56	-	540	1.2	1.0	25	128
3/19/63	1650	39	10.7	1.00	6.6	25	-	185	1.2	1.1	8	22
3/25/63	1260	44	11.0	2.90	7.3	49	-	350	1.0	0.7	19	67
3/30/63	1060	47	9.8	0.00	7.2	45	-	310	0.6	0.6	19	60.0
4/4/63	506	52	9.8	5.3	7.6	53	-	310	1.0	0.86	18	61.68
4/16/63	180	53	10.1	1.03	7.5	75	-	300	0.7	0.4	17	66.7
4/22/63	582	56	10.4	0.0	7.4	43	-	225	0.6	0.6	13	35.0
4/29/63	199	56	9.8	35.6	8.2	75	-	360	0.6	0.5	18	56.7
5/5/63	206	59	8.9	2.87	7.6	66	-	370	0.9	0.6	20	50.0
5/9/63	232	67	8.3	8.04	7.8	66	-	350	0.5	0.5	17	73.4
5/17/63	235	62	9.8	13.20	7.6	72	-	380	0.6	0.5	18	83.4
5/23/63	245	58	9.2	1.72	7.5	80	-	400	0.6	0.3	21	81.7
5/24/63	235	58	10.1	14.92	7.8	82	-	390	0.4	0.3	17	81.7

TABLE NO. 4(a)
MAHONING RIVER AT LEAVITTSBURG
(U.S. Rt. 422 Cont'd.)

Date Sampled	Flow* c.f.s.	Temp. °F.	D.O. mg/1	Phenol p.p.b.	pH	Total Alkalinity mg/1	Total Acidity mg/1	Conductivity μ mhos/cm	Total** Iron mg/1	Ferrous** Iron mg/1	Chlorides mg/1	Sulfates mg/1
6/6/63	256	74	8.6	10.34	7.3	45	-	350	0.6	0.4	20	70.0
6/10/63	454	75	8.0	6.66	7.5	47	-	400	0.5	0.5	15	61.7
6/22/63	235	70	7.8	23.0	7.7	61	-	390	0.3	0.3	20	80.0
6/29/63	245	76	6.8	11.85	7.4	65	-	370	0.4	0.2	20	71.7
7/5/63	235		7.6	6.9	7.3	56	-	370	0.4	0.4	20	81.7
7/16/63	273	73	3.6	4.59	6.9	61	-	400	0.6	0.6	18	73.4
7/22/63	284	75	7.6	0.57	7.8	59	-	400	0.3	0.3	18	81.7
7/28/63	262	79	7.4	4.59	7.6	56	-	400	0.6	0.6	18	81.3
7/31/63	284	67	8.3	4.82	7.4	58	-	390	0.3	0.3	19	86.7
8/13/63	252	74	8.0	8.72	7.2	61	-	390	0.4	0.3	18	76.7
8/16/63	248	71	8.3	2.30	7.5	63	-	410	0.3	0.2	19	93.4
8/26/63	248	73	8.0	2.30	7.8	59	-	400	0.3	0.3	20	78.4
9/2/63	238	69	7.8	13.2	7.7	64	-	420	0.6	0.3	18	93.4
9/9/63	219	72	8.0	111.4	7.8	67	-	430	0.1	0.1	19	83.4
9/22/63	199	64	8.3	2.53	7.6	69	-	450	0.6	0.6	20	96.7
9/30.63	180	63	8.3	5.85	7.9	64	-	470	0.3	0.3	21	91.7
10/6	174	58	9.2	2.87	7.6	74	-	470	0.3	0.3	25	96.7
10/14	165	60	8.9	3.67	7.7	72	-	480	0.09	0.09	24	95.0
10/27	131	63	8.6	0.00	7.6	88	-	520	0.3	0.3	24	103.4
10/29	128	58	7.6		7.6	89	-	450	0.3	0.2	23	106.7
11/11	102	4[illegible]	10.1	0.46	7.2	98	-	530	0.09	0.09	22	106.7
11/19	107	46	10.5	0.0	7.6	90	-	540	0.2	0.2	25	113.4
11/21	107	48	9.8	0.0	7.6	90	-	560	0.4	0.2	26	116.7
11/22	105	50	9.5	0.0	7.9	89	-	550	0.2	0.1	27	120.0
11/27	136	43	10.7	2.4	7.7	97	-	540	0.2	0.0	27	125.0
12/16	95	33	11.9	0.0	8.0	96	-	590	0.3	0.2	32	190.0
12/29	110	32	11.0	0.0	8.6	103	-	580	0.1	0.0	30	118.4
12/30	95	32	11.6	0.0	6.9	109	-	600			32	130.0

TABLE NO. 2(b)

STREAM WATER QUALITY - 1964

MAHONING RIVER BASIN

MAHONING RIVER AT LEAVITTSBURG (U.S. Rt. 422)

Date Sampled	Flow* c.f.s.	Temp. °F.	D.O. mg/1	Phenol p.p.b.	pH	Total Alkalinity mg/1	Total Acidity mg/1	Con-ductivity µmhos/cm	Total** Iron mg/1	Ferrous** Iron mg/1	Chlorides mg/1	Sulfates mg/1
1/5/64	110	35	11.3	0.0	8.4	108		600	1.0	0.2	34	118
1/8	110	33	12.0	7.1	7.3	113		650	0.4	0.3	39	167
1/18	98	35	11.9	0.0	7.1	103		740	0.6	0.5	48	177
1/26	1220	33	12.4	0.0	7.6	38		360	3.5	2.2	30	77
2/2/64	130	33	12.4	0.0	7.4	67		470	0.6	0.4	33	133
2/12	140	34	11.9	0.0	7.5	81		460	0.5	0.1	41	140
2/18	110	35	10.7	4.76	7.6	99		580	0.3	0.2	42	180
2/24	112	33	11.3	0.0	7.2	105		650	0.5	0.3	41	233
2/29	131	35	11.3	0.0	7.5	99		660	0.6	0.4	43	213
3/3/64	235	38	11.0	0.0	7.6	82	8	540	0.6	0.5	26	133
3/14	1610	40	11.0	0.0	7.1	46	6	370	0.4	0.4	41	100
3/20	1360	40	10.7	0.0	7.5	53	2	370	1.2	0.6	24	80
3/30	245	39	10.7	4.8	7.3	44	30	360	1.1	0.5	24	73
3/28	490	42	10.3	0.0	7.5	52	4	340	0.5	0.5	24	80
4/18/64	288	54	8.9	0.0	7.7	45	6	300	0.7	0.3	20	70
4/21	2750	56	8.0	0.0	7.8	40	8	230	0.5	0.1	21	47
4/26	2520	56	8.9	0.0	8.0	43	3	300	1.2	0.8	21	75
4/30	1960	57	8.9	0.0	7.3	45	8	245	0.5	0.2	18	65
5/7	280	69	7.8	0.0	7.7	69	4	300	0.4	0.1	19	78
5/11	245	68	7.6	0.0	7.9	83	3	350	0.5	0.3	19	77
5/17	332	64	7.4	0.0	8.0	62	1	280	0.8	0.7	23	65
5/31	222	62	8.0	0.0	7.8	72	4	350	0.6	0.4	22	82

TABLE NO. 2(b)

MAHONING RIVER AT LEAVITTSBURG
(U.S. Rt. 422 Cont'd.)

Date Sampled	Flow* c.f.s.	Temp. °F.	D.O. mg/1	Phenol p.p.b.	pH	Total Alkalinity mg/1	Total Acidity mg/1	Conductivity µmhos/cm	Total** Iron mg/1	Ferrous** Iron mg/1	Chlorides mg/1	Sulfates mg/1
6/6/64	228	67	8.0	0.0	7.3	71	3.5	360	0.9	0.7	23	100
6/11	222	74	7.6	0.0	7.8	58	4	355	0.3	0.0	19	93
6/24	288	77	6.6	0.0	8.0	73	3	400	0.1	0.0	24	85
6/27	225	76	7.4	0.0	7.9	88	3	390	0.2	0.0	18	83
7/8/64	235	74	10.4	0.0	7.9	70	4.5	320	0.5	0.3	23	88
7/16	340	70	7.8	0.0	7.9	78	6	390	0.1	0.1	21	75
7/26	276	77	6.8	0.0	8.1	85	2	370	0.2	0.0	25	78
7/28	232	76	7.8	4.8	8.1	75	3	370	0.3	0.1	20	85
7/31	238	78	8.0	0.0	7.7	57	0.5	375	0.3	0.1	23	107
8/4/64	238	73	9.6	0.0	7.7	75	9	330	0.6	0.2	20	93
8/14	252	70	8.0	0.0	8.0	95	7	380	0.3	0.1	24	103
8/22	292	69	7.8	0.0	8.2	91	6	400	0.4	0.3	24	118
8/30	235	76	8.0	0.0	7.9	87	8	420	0.7	0.4	20	123
9/10/64	203	77	7.8	0.0	8.3	95	3	420	1.1	0.2	22	113
9/15	206	64	7.8	0.0	7.8	84	5	420	0.1	0.1	23	120
9/25	165	66	8.3	---	7.9	85	7	425	0.5	0.3	22	120
9/29	167	64	7.6	0.0	7.9	83	10	400	0.1	0.0	19	88
10/2/64	Data	61	8.6	0.0	7.9	91	4	400	0.4	0.3	17	117
10/6	NA	--	8.9	0.0	8.1	98	3	400	0.2	0.2	21	117
10/23	"	50	8.9	0.0	7.7	85	20	460	0.2	0.2	21	137
10/27	"	53	8.3	0.0	8.0	104	5	455	0.3	0.3	21	123
10/30	"	54	8.9	0.0	8.0	103	7	450	0.2	0.2	11	133
11/6/64	"	51	8.9	0.0	8.1	112	5	480	0.2	0.2	31	127
11/12	"	55	8.9	0.0	7.9	113	7	475	0.3	0.1	28	150
11/20	"	54	9.5	0.0	7.9	117	6	495	0.3	0.2	27	137
11/24	"	39	10.7	0.0	8.3	107	3	480	0.3	0.3	29	137
12/4/64	"	36	11.0	0.0	8.2	146	2	495	0.2	0.2	32	133.2
12/11	"	36	11.0	0.0	7.8	148	7	550	0.4	.1	35	
12/14	"	36	11.0	0.0	7.9	118	6	530	0.2	0.2	47	
12/23	"	36	12.8	0.0	7.9	105	6	500	.4	---	24	
12/29	"	40	9.5	0.0	7.7	73	6	435	2.2	1.6	38	

TABLE NO. 3(a)

STREAM WATER QUALITY - 1963

MAHONING RIVER BASIN

MAHONING RIVER AT NILES
(Park Avenue Bridge)

Date Sampled	Flow* c.f.s.	Temp. °F.	D.O. mg/l	Phenol p.p.b.	pH	Total Alkalinity mg/l	Total Acidity mg/l	Con-ductivity μ mhos/cm	Total** Iron mg/l	Ferrous** Iron mg/l	Chlorides mg/l	Sulfates mg/l
1/6/63	Data	50	4.4		8.9	32	---	720	10.84		34	
1/8	NA	52	0.08		6.6	6	---	820	10.89		38	
1/12	"	44	8.9		7.2	31	---	590	15.0		39	
1/15	"	38	10.7		7.4	62	---	555	17.0		35	
1/17	"	40	5.7		7.2	43	---	570	32.15		44	
1/31	"	46	7.2		7.0	77	---	660	8.0		53	
2/3/63	"	42	8.3		7.0	44	---	730	14.0		51	
2/10	"	47	5.1	79.7	7.0	71	---	570	14.0	14.0	41	
2/19	"	52	3.8	454	6.7	32	---	750	14.0	12.0	55	
2/25	"	46	4.1	494	6.7	35	---	770	20.0	14.0	61	250
2/26	"	41	5.0	60.2	7.0	68	---	780	18.0	14.0	54	350
3/11/63	"	37	12.0	3.0	6.6	13	---	290	10.0	6.0	20	46
3/19	"	39	5.1	2.0	6.5	21	---	225	5.0	4.1	10	37
3/25	"	46	9.5	21.34	7.0	41	---	390	5.0	4.6	26	73
3/30	"	49	4.2	5.54	6.8	25	---	390	6.4	4.6	19	93.4
4/4/63	"	56	2.40	13.7	6.7	14	---	420	14.1	10.0	27	150
4/16	"	66	2.82	117.33	6.4	23	---	490	13.2	12.3	29	216.7
4/22	"	59	7.2	41.21	7.0	22	---	320	7.3	1.8	16	66.7
4/29	"	64	5.6	12.1	6.9	29	---	560	16.8	16.8	25	243.4
5/5/63	"	69	4.5	379	6.5	7	---	520	11.4	2.3	26	200.0
5/9	"	79	2.9	25.26	6.4	20	---	500	6.4	5.0	28	226.7
5/17	"	73	2.82	29.85	6.6	15	---	640	21.8	17.3	34	290.1
5/23	"	69	3.8	43.62	6.5	25	---	560	11.8	8.6	28	260.1
5/24	"	68	6.6	57.40	6.3	26	---	520	14.2	10.8	22	213.4

TABLE NO. 3(a)

MAHONING RIVER AT NILES
(Park Avenue Bridge)

Date Sampled	Flow* c.f.s.	Temp. °F.	D.O. mg/l	Phenol p.p.b.	pH	Total Alkalinity mg/l	Total Acidity mg/l	Conductivity µ mhos/cm	Total** Iron mg/l	Ferrous** Iron mg/l	Chlorides mg/l	Sulfates mg/l
6/6/63	Data	82	2.4	9.18	5.5	?	?	750	30.0	23.6	28	313.4
6/10	NA	83	4.2	6.89	6.9	59	---	530	2.7	1.4	24	140.0
6/22	"	78	0.08	16.1	6.9	41	---	550	5.0	2.7	26	206.7
6/29	"	83	6.4	12.2	6.0	13	---	520	8.2	8.2	32	166.1
7/5/63	"	83	1.50	8.7	5.3	0.0	47	770	8.2	5.5	28	313.4
7/16	"	81	5.0	6.89	7.0	12.0	---	610	9.1	6.8	27	266.7
7/22	"	80	2.17	3.9	6.6	11.0	---	530	8.2	5.0	23	220.0
7/28	"	85	1.16	9.18	6.8	30.0	---	500	1.4	1.4	22	190.0
7/31	"	85	3.40	19.75	5.8	15.0	---	530	7.6	1.4	26	210.0
8/13/63	"	80	2.65	16.53	5.6	5.0	---	560	12.7	2.7	27	233.4
8/16	"	79	3.60	21.24	5.4	9.0	---	750	16.4	15.5	26	283.4
8/26	"	76	2.17	7.46	6.6	20.0	---	480	11.8	8.2	28	150.0
9/2/63	"	74	0.96	13.2	7.0		---		0.5	0.5		
9/9	"	75	4.4	12.05	6.7	30	---	540	2.7	0.9	30	233.4
9/22	"	69	2.57	1.84	6.8	50	---	510	5.0	1.4	25	186.7
9/30	"	68	5.1	9.87	7.6	34	---	600	1.8	0.9	28	176.7
10/6/63	"	66	4.2	94.71	6.7	26	---	590	1.4	1.4	34	213.4
10/14	"	68	1.64	26.40	6.7	14	---	610	4.6	1.4	36	226.8
10/27	"	74	1.7	48.8	6.5	48	---	650	1.8	1.8	32	240.1
10/29	"	68	4.7		6.6	41	---	670	2.7	1.8	40	293.4
11/11/63	"	58	4.0	4.6	7.4	94	---	670	0.0	0.0	30	206.7
11/19	"	65	3.20	47.6	6.8	38	---	770	4.1	4.1	43	280.1
11/21	"	64	3.9	76.2	6.4	12	---	770	4.1	0.5	42	313.4
11/22	"	65	2.31	42.8	6.3	27	---	770	1.8	0.9	34	346.7
11/29	"	52	4.7	66.6	6.4	21	---	610	8.2	4.6	33	333.4
12/16/63	"	50	3.9	1084.8	7.4	1	---	920	8.2	1.8	66	433.4
12/29	"	48	8.0	114.2	7.3		40.0	820	13.2	3.6	49	326.7
12/30	"	45	3.4	1561.3	6.6	19	---	820	9.1	4.1	55	333.4

TABLE NO. 3(b)

STREAM WATER QUALITY - 1964

MAHONING RIVER BASIN

MAHONING RIVER AT NILES
(Park Avenue Bridge)

Date Sampled	Flow* c.f.s.	Temp. °F.	D.O. mg/l	Phenol p.p.b.	pH	Total Alkalinity mg/l	Total Acidity mg/l	Conductivity µmhos/cm	Total** Iron mg/l	Ferrous** Iron mg/l	Chlorides mg/l	Sulfates mg/l
1/5/64	Data Not Available	50	7.6	66.6	6.9	50	-	820	30.4	4.6	56	427
1/8/64		52	7.6	95.2	6.4	15	-	860	24.1	3.2	54	453
1/18		50	5.4	80.9	6.3	34	-	940	33.7	25.9	60	420
1/26		35	10.4	23.8	7.4	43	-	380	14.6	11.4	32	77
2/2/64		48	9.8	61.9	3.5	0	205	860	33.7	30.5	42	333
2/12		50	6.4	619.	5.9	9	-	690	77.4	41.9	48	327
2/18		54	7.4	390.	6.3	16	-	820	25.0	16.4	62	427
2/24		51	6.8	1656.	6.9	68	-	840	6.8	2.3	60	333
2/29		41	5.7	119.	6.6	19	-	820	25.0	21.8	52	433
3/3/64		49	8.0	162.	6.8	71	55	680	5.9	1.4	27	273
3/14		43	9.8	9.5	7.2	38	13	400	12.7	2.3	53	100
3/20		44	11.9	9.5	6.9	50	20	400	12.3	5.5	24	97
3/28		47	4.7	19.0	6.6	35	48	400	6.4	1.4	25	107
3/30		48	3.7	47.6	7.3	43	28	550	10.5	0.5	53	160
4/18/64		67	3.9	38.1	5.0	4	130	540	25.0	11.8	45	217
4/21		56	6.8	4.8	7.5	48	13	290	24.1	23.2	26	90
4/26		58	6.6	4.8	7.8	37	5	320	3.2	2.3	20	77
4/30		58	6.2	14.3	7.0	39	10	285	4.5	3.1	19	67
5/7/64		77	7.2	38.1	4.3	0	75	590	3.6	0.4	29	300
5/11		77	5.0	28.6	6.5	43	25	520	13.2	4.5	29	227
5/17		68	1.8	28.6	6.9	21	5	340	7.7	6.3	23	71
5/31		70	4.2	9.5	6.8	42	20	480	10.9	9.5	27	187

TABLE NO. 3(b)
MAHONING RIVER AT NILES
(Park Avenue Bridge, Cont'd)

Date Sampled	Flow* c.f.s.	Temp. °F.	D.O. mg/1	Phenol p.p.b.	pH	Total Alkalinity mg/1	Total Acidity mg/1	Conductivity mhos/cm	Total** Iron mg/1	Ferrous** Iron mg/1	Chlorides mg/1	Sulfates mg/1
6/6/64	Data	75	4.2	23.8	4.6	1	32	490	16.4	15.9	29	267
6/11	Not	80	4.6	52.4	6.0	15	43	570	6.8	0.9	32	314
6/24	Available	84	1.7	33.2	7.2	35	5	660	5.5	5.5	28	273
6/27	"	84	3.7	28.6	4.4	0	50	500	11.4	0.0	29	249
7/8/64	"	82	2.8	28.6	6.9	36	11	500	2.7	1.1	34	180
7/16	"	81	4.4	28.6	6.8	32	12	500	3.6	2.2	35	186
7/26	"	86	.2	19.0	7.3	13	12	450	8.6	7.7	29	157
7/28	"	85	2.2	956.8	6.9	21	11	490	3.6	2.2	36	210
7/31	"	84	2.2	647.4	6.6	19	11	530	4.6	3.7	35	203
8/4/64	"	83	2.8	23.8	5.5	6	50	540	10.9	9.6	28	227
8/14	"	78	4.4	42.8	-	-	48	620	19.1	18.9	29	300
8/28	"	77	3.6	33.3	6.8	17	16	480	9.1	5.5	26	200
8/30	"	84	2.4	28.6	4.2	-	55	690	14.6	11.8	25	333
9/10/64	"	86	1.1	23.8	6.8	27	28	520	17.3	6.4	32	257
9/15	"	75	2.6	34.1	7.1	67	15	560	3.6	0.0	35	193
9/25	"	75	4.9	-	5.8	7	102	820	38.2	25.9	31	360
9/29	"	74	4.5	309.0	6.9	65	26	580	36.4	1.4	40	206
10/2/64	"	75	3.3	57.1	5.9	23	64	650	9.6	9.6	37	326
10/6	"	-	7.8	95.2	6.3	32	61	670	16.8	9.1	31	253
10/23	"	65	9.2	76.1	6.3	30	53	820	34.6	20.9	35	346
10/27	"	69	1.2	85.6	6.2	25	121	830	15.0	13.7	33	320
10/30	"	67	3.9	509.2	6.6	47	25	680	12.7	12.3	34	353
11/6/64	"	69	4.1	120.0	6.2	28	106	840	12.7	11.4	40	413
11/12	"	71	1.4	768.0	6.5	46	84	710	25.9	22.3	45	440
11/20	"	59	6.6	71.4	5.8	18	158	760	68.3	34.1	39	400
11/24	"	57	5.9	178.0	7.0	53	47	720	11.9	8.2	42	333
12/4/64	"	50	6.2	85.7	7.0	35	20	635	10.9	1.4	49	253.2
12/11	"	53	6.6	109.5	6.6	70	46	725	12.7	10.5	55	-
12/14	"	46	7.4	109.5	7.4	101	14	650	3.2	1.4	54	
12/23	"	54	6.8	233.2	6.4	50	59	720	4.6	-	52	
12/29	"	50	5.6	71.4	6.9	59	23	555	5.6	4.6	45	

TABLE NO. 4(a)

STREAM WATER QUALITY - 1963

MAHONING RIVER BASIN

MAHONING RIVER AT YOUNGSTOWN (Bridge Street)

Date Sampled	Flow* c.f.s.	Temp. °F.	D.O. mg/1	Phenol p.p.b.	pH	Total Alkalinity mg/1	Total Acidity mg/1	Con-ductivity µmhos/cm	Total** Iron mg/1	Ferrous** Iron mg/1	Chlorides mg/1	Sulfates mg/1
1/6/63	194	55	7.2	-	7.1	31	-	686	2.89	-	39	-
1/8	194	58	6.4	-	6.9	25	-	670	0.44	-	39	-
1/12	389	56	4.2	-	6.8	22	-	670	21.0	-	48	-
1/15	371	39	10.7	-	7.2	71	-	590	4.0	-	40	-
1/17	223	38	8.3	-	7.3	81	-	550	28.0	-	53	-
1/31	223	54	7.8	-	7.3	92	-	690	10.0	-	52	-
2/3/63	204	44	6.4	-	7.3	46	-	760	6.0	-	67	-
2/10	185	43	4.7	7.0	7.1	43	-	790	6.0	6.0	50	-
2/19	264	56	5.4	192.	6.9	48	-	780	8.0	6.0	69	-
2/25	204	47	5.1	243.	6.7	40	-	730	12.0	6.0	59	300
2/26	204	50	6.8	210.	7.0	44	-	820	10.0	8.0	62	230
3/11/63	1410	39	11.6	0.0	6.7	19	-	300	10.0	4.0	22	40
3/19	3110	44	9.2	1.93	6.6	24	-	240	4.6	3.6	11	22
3/15	1670	49	9.8	8.80	7.1	24	-	410	3.6	2.3	24	73
3/30	1480	54	8.3	4.67	6.9	25	-	390	5.0	3.2	22	86.7
4/4/63	822	60	6.8	24. 7	6.9	21	-	440	9.1	4.1	27	146.7
4/16	313	75	4.1	24.22	6.6	9	-	670	10.0	6.4	57	250.1
4/22	1140	60	6.2	14.92	7.2	39	-	320	5.9	3.6	21	46.7
4/29	371	66	4.9	18.37	7.1	33	-	530	5.5	2.7	28	206.7
5/5/63	389	76	5.7	166.	5.8	9	-	620	6.4	4.1	45	233.4
5/9	365	89	5.9	22.20	6.5	8	-	540	1.8	0.5	38	253.4
5/17	347	89	6.0	27.55	6.9	31	-	690	1.8	0.5	40	266.7
5/23	359	74	5.7	18.37	6.8	46	-	610	1.8	0.5	41	213.4
5/24	341	83	6.6	51.66	6.6	36	-	-	1.2	0.3	41	-

TABLE NO. 4(a)

MAHONING RIVER AT YOUNGSTOWN
(Bridge Street)

Date Sampled	Flow* c.f.s.	Temp. °F.	D.O. mg/l	Phenol p.p.b.	pH	Total Alkalinity mg/l	Total Acidity mg/l	Conductivity µmhos/cm	Total** Iron mg/l	Ferrous** Iron mg/l	Chlorides mg/l	Sulfates mg/l
6/6/63	428	97	5.3	6.20	4.6	0	?	700	8.2	4.6	37	300.1
6/10	656	89	4.8	7.46	6.9	8	-	610	0.9	0.9	31	150.0
6/22	374	83	5.7	19.6	7.1	28	-	560	1.8	1.4	32	150.0
6/29	398	92	4.7	16.3	6.8	38	-	470	0.9	0.9	39	137.4
7/5/63	398	83	4.6	2.75	5.5	9		470	5.5	2.8	24	166.7
7/16	431	85	1.5	4.13	7.2	20	-	490	1.4	1.4	26	140.0
7/22	480	84	5.7	4.25	7.0	14	-	460	0.5	0.0	25	136.7
7/28	424	90	4.0	5.17	6.2	7	-	500	1.8	1.4	24	208.7
7/31	459	87	5.0	10.10	6.6	34	-	450	1.8	0.9	24	123.4
8/13/63	438	85	4.9	6.89	6.4	29		460	0.9	0.5	23	116.7
8/16	362	86	5.0	9.18	6.3	26	-	480	0.9	0.5	25	186.7
8/26	350	80	6.0	5.74	7.1	31	-	450	3.2	1.4	30	126.7
9/2/63	298	79	5.4	10.33	6.3	6	-	540	0.5	0.5	34	250.1
9/9	298	79	5.0	9.53	6.7	15	-	550	0.0	0.0	30	250.1
9/22	243	73	4.9	0.0	6.7	36	-	570	0.5	0.5	39	233.4
9/30	228	76	4.6	4.59	7.2	21	-	630	0.9	0.5	35	206.7
10/6/63	238	78	3.48	5.74	6.6	6	-	670	0.9	0.5	46	246.7
10/14	228	73	4.4	6.54	6.3	7	-	650	0.5	0.5	41	283.4
10/27	217	82	3.7	3.56	6.6	39	-	700	1.8	1.8	45	260.1
10/29	221	70	3.4	-	6.5	25	-	650	2.3	1.4	43	306.7
11/11/63	230	66	4.4	5.7	6.2	9	-	650	0.0	0.0	39	226.7
11/19	217	64	5.7	0.0	6.6	15		650	1.8	0.5	45	260.1
11/21	221	70	5.1	4.8	6.7	19	-	700	1.4	0.5	45	266.7
11/22	212	70	3.60	4.8	6.7	25	-	730	1.8	0.5	44	266.7
11/29	346	56	4.6	4.8	6.6	21	-	620	1.4	0.0	37	266.7
12/16/63	153	44	3.40	28.6	7.1	-	44	940	7.8	1.8	67	466.8
12/29	170	50	3.20	9.5	7.3	68	-	720	2.3	0.5	49	220.0
12/30	164	45	5.6	9.5	6.6	46	-	780	1.8	1.4	59	266.7

TABLE NO. 4(b)

STREAM WATER QUALITY - 1964

MAHONING RIVER BASIN

MAHONING RIVER AT YOUNGSTOWN
(Bridge St.)

Date Sampled	Flow* c.f.s.	Temp. °F.	D.O. mg/1	Phenol p.p.b.	pH	Total Alkalinity mg/1	Total Acidity mg/1	Conductivity µmhos/cm	Total** Iron mg/1	Ferrous** Iron mg/1	Chlorides mg/1	Sulfates mg/1
1/5/64	192	55	4.6	147.6	6.9	33		750	13.6	2.3	58	313.4
1/8	185	52	6.4	261.8	6.5	22		820	13.2	1.4	67	380.1
1/18/64	167	56	7.4	47.6	6.4	56		940	9.6	4.6	68	373.4
1/26/64	1620	36	7.8	14.3	7.3	51		420	8.2	4.6	37	120.0
2/2/64	204	54	4.2	228.4	6.0		62	700	6.4	2.7	52	346.7
2/12/64	221	48	7.0	133.3	6.9	69		690	27.8	20.0	60	233.4
2/18/64	189	50	3.2	366.5	6.6	30		800	10.9	7.3	73	400.0
2/24/64	181	51	6.0	161.8	6.5	15		900	22.3	16.8	65	466.8
2/29/64	189	62	3.9	17.9	6.6	26		920	8.7	4.6	79	420.1
3/3/64	442	60	5.9	47.6	6.7	-	43	760	5.9	1.4	24	266.7
3/14/64	2160	44	7.2	9.5	7.0	28	11	340	6.8	3.2	60	81.7
3/20/64	1650	45	8.9	14.3	7.0	49	16	430	7.3	2.3	29	100.0
3/28/64	772	52	7.2	9.5	6.9	42	22	400	5.9	0.9	27	103.4
3/30/64	460	46	4.5	19.0	7.1	44	24	470	7.3	0.5	34	140.0
4/18/64	422	71	3.5	4.8	6.9	30	26	510	5.0	4.5	44	141.7
4/21/64	5000	55	7.0	0.0	8.1	69	2	360	8.2	8.2	22	88.4
4/26/64	3000	59	6.8	4.8	7.3	38	6	300	2.7	1.3	21	76.7
4/30/64	6080	58	4.6	4.8	7.9	60	2	330	3.2	1.8	17	93.4
5/7/64	588	80	3.4	0.0	7.1	37	8	480	6.4	3.7	36	186.8
5/11/64	491	74	5.6	4.8	7.2	47	6	340	1.8	0.9	34	93.4
5/17/64	668	71	2.9	4.8	7.6	39	4	350	0.9	0.9	21	60.0
5/31/64	289	76	-	2.4	7.4	63	5	580	5.0	3.6	38	200
6/6/64	328	84	4.4	4.8	3.9	0	23	600	7.7	7.2	34	320
6/11/64	310	88	4.0	0.0	7.2	22	6	520	1.8	.9	24	250
6/24/64	358	90	3.4	14.3	7.7	54	5	540	0.9	0.9	39	250
6/27/64	334	82	3.3	4.8	6.6	20	13	580	0.9	0.9	33	254

TABLE NO. 4(b)
MAHONING RIVER AT YOUNGSTOWN
(Bridge St. Cont'd.)

Date Sampled	Flow* c.f.s.	Temp. °F.	D.O. mg/1	Phenol p.p.b.	pH	Total Alkalinity mg/1	Total Acidity mg/1	Con-ductivity μ mhos/cm	Total** Iron mg/1	Ferrous** Iron mg/1	Chlorides mg/1	Sulfates mg/1
7/8/64	428	86	3.5	4.8	7.2	41	8	390	0.9	0.4	30	137
7/16/64	542	82	4.1	4.8	7.3	32	3.5	460	0.9	0.9	31	160
7/26/64	505	88	2.9	4.8	7.1	33	6	430	0.5	0.0	28	137
7/31/64	422	86	3.9	4.8	6.7	21	4	500	0.9	0.4	32	193
8/4/64	463	84	3.3	4.8	7.0	55	15	450	2.7	.5	25	130
8/14/64	396	82	3.1	14.3	4.8	3	18	480	4.1	2.7	33	250
8/22/64	644	85	3.0	9.5	7.4	42	6	490	1.6	1.4	31	150
8/30/64	340	90	3.2	0.0	7.2	12	11	530	1.4	.5	30	257
9/10/64	322	98	3.4	0.0	7.6	38	9	570	10.0	1.4	36	240
9/15/64	300	93	3.9	9.5	5.9	7	17	550	0.5	0.0	35	253
9/25/64	344	79	8.3	-	5.4	5	25	490	1.4	.9	32	176
9/29/64	253	76	7.4	0.0	3.9	3.9	43	655	18.2	.9	39	354
10/2/64	Data	79	6.0	0.0	5.7	6.0	23	600	11.4	.5	32	266
10/6/64	Not	Broke	4.7	0.0	4.2	4.2	40	740	9.1	5.0	42	306
10/23/64	Available	71	7.6	0.0	5.1	4.0	22	870	11.8	9.6	44	373
10/27/64	"	73	4.2	0.0	6.6	24.0	65	840	12.7	8.6	38	333
10/30/64	"	75	3.5	0.0	6.4	24.0	50	665	7.3	4.1	37	333
11/6/64	"	76	2.6	18.0	4.7	2	32	660	1.4	1.4	47	360
11/12/64	"	77	2.8	10.0	6.5	20	14	620	1.8	.9	49	280
11/20/64	"	63	4.9	19.0	5.9	9	100	650	24.1	7.3	48	346
11/24/64	"	58	6.2	38.0	6.5	14	76	640	37.3	26.8	51	407
12/4	"	68	5.9	33.3	7.2	38	20	675	5.6	1.4	56	207
12/11	"	64	5.3	276.1	6.9	40	28	800	6.4	6.4	62	
12/14	"	47	7.2	19.0	7.2	83	10	610	4.6	4.1	49	
12/23	"	59	6.2	52.4	6.5	22	42	800	5.5	-	59	
12/29	"	49	6.2	42.8	7.3	66	14	470	5.6	1.8	40	

TABLE NO. 5(a)

STREAM WATER QUALITY - 1963

MAHONING RIVER BASIN

MAHONING RIVER AT STRUTHERS
(Ohio Route 616)

Date Sampled	Flow* c.f.s.	Temp °F.	D.O. mg/l	Phenol p.p.b.	pH	Total Alkalinity mg/l	Total Acidity mg/l	Con-ducitvity µmhos/cm	Total** Iron mg/l	Ferrous** Iron mg/l	Chlorides mg/l	Sulfates mg/l
1/6/63	No	61	5.6		7.3	28		790	4.51		43	
1/8/63	Data	66	3.6		6.7	7		820	0.11		50	
1/12	"	59	5.9		7.1	34		765	16.0		50	
1/15	"	46	8.0		7.3	21		685	24.0		45	
1/17	"	46	4.6		6.8	52		790	62.0		66	
1/31	"	60	3.6		6.9	48		860	6.0		68	
2/3	"	53	7.4		7.5	46		900	4.0		108	
2/10	"	60	5.7	191.	7.1	67		880	18.0	18.0	83	
2/19	"	65	3.6	261	6.7	14		920	16.0	14.0	76	
2/25	"	59	5.3	326	6.8	51		940	14.0	10.0	82	330
2/26	"	60	4.9	339	6.9	33		1000	22.0	12.0	84	320
3/11	"	40	11.0	11.	6.9	27		360	8.0	6.0	26	63
3/19	"	44	6.6	7.	6.9	43		330	7.7	5.0	19	42
3/25	"	53	8.6	80.	7.1	33		440	6.4	4.1	29	83
3/30	"	59	7.6	103.	6.9	32		440	5.0	3.2	27	107.
4/4	"	63	5.9	79.	6.9	21		480	10.0	5.0	33	160.
4/16	"	85	2.17	445.	5.8	7		880	35.9	35.5	47	453.
4/22	"	67	4.1	97.	7.1	35		390	10.5	8.2	29	72.
4/29	"	79	3.9	21	7.3	55		600	5.9	2.7	42	200.
5/5	"	86	4.2	217	6.6	11		680	6.8	3.6	42	220.
5/9	"	101	2.72	210	6.5	10		750	7.7	0.9	54	303.
5/17	"	94	3.09	40	6.5	7		770	9.6	5.0	50	317.
5/23	"	87	2.40	294.	6.4	29		670	11.8	7.7	51	313.
5/24	"	93	1.42	221.	6.5	28		780	7.4	3.6	53	347.

TABLE NO. 5(a)

MAHONING RIVER AT STRUTHERS
(Ohio Route 616, Cont'd.)

Date Sampled	Flow* c.f.s.	Temp. °F.	D.O. mg/l	Phenol p.p.b.	pH	Total Alkalinity mg/l	Total Acidity mg/l	Conductivity µmhos/cm	Total** Iron mg/l	Ferrous** Iron mg/l	Chlorides mg/l	Sulfates mg/l
6/6	"	104	2.57	182.	6.0	13	-	760	8.2	4.1	49	307.
6/10	"	97	4.0	138.	7.0	22	-	660	1.4	1.4	37	203.
6/22	"	92	2.65	62.	6.8	8	-	710	4.6	2.3	39	287.
6/29	"	103	2.46	18.	6.2	14	-	620	5.5	2.8	40	190.
7/5	"	94	2.57	14.	6.2	10	-	600	1.8	0.9	40	213.
7/16	"	92	7.8	62	7.5	12	-	640	1.8	1.8	43	153.
7/22	"	89	2.82	67	7.6	21	-	590	2.3	0.9	37	127.
7/28	"	96	4.5	25.	7.6	42	-	620	0.9	0.9	32	149.
7/31	"	91	3.28	87	6.6	32	-	560	2.3	1.4	34	153.
8/13	"	89	4.9	102.	6.4	29	-	460	6.8	1.4	23	117.
8/16	"	92	4.1	171.	6.8	57	-	580	1.4	0.9	41	173.
8/26	"	90	3.48	50.	6.6	52	-	600	10.5	5.5	43	193.
9/2	"	88	3.8	142.0	6.4	6	-	670	1.8	0.5	38	258.4
9/9	"	91	3.48	4.59	6.5	7	-	730	1.8	0.9	41	300.1
9/22	"	82	5.1	80.36	7.1	57	-	700	0.9	0.5	48	193.4
9/30	"	90	2.9	121.0	6.8	10	-	800	1.8	0.5	48	300.0
10/6	"	82	4.6	94.14	7.0	12	-	810	1.4	0.9	59	280.1
10/14	"	86	3.60	63.70	6.6	26	-	800	1.8	0.9	59	333.4
10/27	"	90	4.9	63.0	7.3	76	-	820	21.8	18.2	57	253.4
10/29	"	86	2.22		6.7	44	-	790	1.8	0.9	54	320.1
11/11	"	80	4.5	80.4	6.3	10	-	740	0.9	0.5	55	286.7
11/19	"	81	4.6	138.0	6.3	8	-	940	20.0	15.5	59	453.7
11/21	"	80	4.9	100.0	6.5	10	-	840	2.7	1.8	68	300.1
11/22	"	84	3.20	38.1	7.1	75	-	820	1.8	0.5	49	266.7
11/29	"	64	4.0	109.5	6.9	62	-	620	3.6	2.5	40	213.4
12/16	"	64	3.40	28.6	7.0	--	56	940	7.8	1.8	67	466.7
12/29	"	59	6.0	233.2	7.4	98	-	880	3.2	2.7	73	246.7
12/30	"	65	4.2	571.2	7.9	79		900	5.0	2.7	70	333.4

TABLE NO. 5(b)

STREAM WATER QUALITY - 1964

MAHONING RIVER BASIN

MAHONING RIVER AT STRUTHERS
(Ohio Route 616)

Date Sampled	Flow* c.f.s.	Temp. oF.	D.O. mg/1	Phenol p.p.b.	pH	Total Alkalinity mg/1	Total Acidity mg/1	Conductivity μ mhos/cm	Total** Iron mg/1	Ferrous** Iron mg/1	Chlorides mg/1	Sulfates mg/1
1/5/64	No Data	67	5.9	219.0	7.1	75		900	5.5	1.8	79	300
1/8	"	67	4.6	476.0	6.4	20		980	20.0	2.7	91	407
1/18	"	68	6.3	523.6	6.7	91		1040	9.6	6.4	91	320
1/26	"	42	7.4	76.2	7.5	65		530	19.1	12.1	41	160
2/2/64	"	62	4.6	76.2	6.9	48		760	12.3	10.5	71	267
2/12	"	63	5.0	333.2	6.8	50		780	10.5	6.4	73	273
2/18	"	75	4.6	447.4	6.4	6		980	25.9	12.7	84	467
2/24	"	69	4.9	371.3	6.7	43		1060	15.0	6.4	100	453
2/29	"	69	5.0	154.7	7.0	80		990	8.2	5.5	91	360
3/3/64	"	63	5.7	126.9	6.8	51	50	860	5.0	0.9	28	247
3/14	"	49	8.9	557.1	7.1	27	11	360	20.5	4.6	80	77
3/20	"	49	6.8	57.1	7.0	51	34	465	7.7	1.8	33	117
3/28	"	56	6.2	185.6	7.1	51	16	480	11.8	1.4	34	100
3/30	"	58	3.2	133.3	6.8	34	42	750	12.7	0.5	96	227
4/18/64	"	78	2.3	52.4	6.0	5	57	640	17.3	10.0	46	250
4/21/64	"	58	6.6	76.2	8.0	76	4	390	28.2	26.8	28	93
4/26	"	62	7.0	52.4	7.5	42	5	330	3.2	1.8	24	88
4/30	"	61	4.5	23.8	7.8	65	3	360	6.4	5.5	18	87
5/7/64	"	88	2.3	47.6	7.3	56	8	560	3.2	2.1	39	180
5/11	"	80	4.6	100.0	7.0	3.6	11.5	480	7.7	6.3	38	150
5/17	"	77	6.0	85.7	8.0	67	3	430	2.7	2.2	28	107
5/31	"	88	4.4	52.4	7.5	60	7	690	5.9	5.4	50	247
6/6/64	"	93	2.5	42.8	6.6	30	14	630	6.4	5.9	47	280
6/11	"	98	2.4	62.4	7.5	50	8.5	700	3.6	1.8	56	300
6/24	"	99	2.3	14.3	7.5	38	5	730	4.6	4.5	52	227
6/27	"	102	1.5	47.6	7.1	46	10	700	2.3	1.8	45	263

TABLE NO. 5(b)
MAHONING RIVER AT STRUTHERS
(Ohio Route 616)

Date Sampled	Flow* c.f.s.	Temp. °F.	D.O. mg/1	Phenol p.p.b.	pH	Total Alkalinity mg/1	Total Acidity mg/1	Con-ductivity μ mhos/cm	Total** Iron mg/1	Ferrous** Iron mg/1	Chlorides mg/1	Sulfates mg/1
7/8/64	No Data	94	1.9	23.8	7.2	50	8.5	500	1.4	0.0	42	150
7/16		85	3.5	71.4	7.0	37	11	530	3.6	3.6	41	167
7/26	"	99	3.3	23.8	7.6	50	6.5	620	3.6	3.1	45	170
7/28	"	101	3.8	238.0	7.4	10	7.5	560	4.1	2.7	39	367
7/31	"	98	3.1	71.4	7.0	37	12	630	5.9	5.0	47	230
8/4/64	"	92	2.8	95.2	6.6	37	22	570	8.2	0.9	43	163
8/14	"	94	2.2	71.4	7.6	48	1	600	3.6	0.5	50	193
8/22	"	92	3.5	57.1	7.9	35	8	590	2.3	0.9	40	167
8/30	"	104	2.5	19.0	7.5	58.0	12	670	2.7	0.9	47	240
9/10	"	108	1.7	47.6	7.5	34.0	21	660	5.5	1.4	71	307
9/15	"	93	2.7	71.4	6.9	35	26	660	1.4	1.4	58	320
9/25	"	90	1.7	-	6.7	33	22	650	3.6	1.8	57	253
9/29	"	98	3.6	90.4	6.2	4	45	880	90.5	11.4	69	386
10/2	"	100	2.1	142.8	6.3	25	21	770	37.8	0.5	67	260
10/6	"	-	5.3	295.8	6.7	25	30	830	2.7	0.5	62	266
10/23	"	87	5.1	95.2	6.3	18	25	900	8.2	1.4	68	453
10/27	"	99	3.2	76.1	6.9	23	40	880	4.6	3.6	63	360
10/30	"	91	2.4	57.1	6.8	23	32	840	6.4	1.4	64	346
11/6	"	94	3.1	60.0	7.1	35	24	770	2.3	1.8	68	393
11/12	"	92	2.7	138.0	6.4	20	49	790	7.3	5.9	70	360
11/20	"	81	4.0	52.4	7.1	46	32	760	3.2	1.8	63	380
11/24	"	87	3.9	95.0	6.4	19	78	770	20.9	14.6	65	440
12/4	"	69	3.4	147.5	8.3	80	6	650	1.8	0.9	72	206.4
12/11	"	72	3.5	261.8	6.9	78	30	800	1.4	1.4	96	
12/14	"	66	6.0	85.7	7.1	76	20	710	1.4	1.4	75	
12/23	"	82	4.2	166.6	6.5	22	38	900	2.3	-	94	
12/29	"	62	6.4	261.8	6.8	51	25	620	5.9	3.6	54	

TABLE NO. 6(a)

STREAM WATER QUALITY - 1963

MAHONING RIVER BASIN

MAHONING RIVER AT LOWELLVILLE
(Lowellville Bridge)

Date Sampled	Flow* c.f.s.	Temp. °F.	D.O. mg/1	Phenol p.p.b.	pH	Total Alkalinity mg/1	Total Acidity mg/1	Conductivity µmhos/cm	Total** Iron mg/1	Ferrous** Iron mg/1	Chlorides mg/1	Sulfates mg/1
1/6/63	234	57	4.2		7.3	30	---	760	0.28		48	
1/8	240	64	2.7		6.7	5	---	858	18.15		54	
1/12	503	58	5.9		7.1	28	---	745	13.0		50	
1/15	483	54	7.6		7.1	45	---	690	14.0		48	
1/17	308	44	5.1		6.9	23	---	745	25.0		60	
1/31	290	58	3.1		6.9	44	---	780	3.0		65	
2/3/63	304	48	6.4		7.4	37	---	990	5.0		141	
2/10	277	55	5.3	148	7.2	75	---	870	4.0	4.0	73	
2/19	353	63	3.9	157	6.9	37	---	790	7.0	7.0	73	
2/25	270	54	5.1	208	7.0	68	---	940	5.0	2.0	85	320
2/26	270	58	3.4	240	6.8	23	---	990	17.0	11.0	81	250
3/11/63	1920	40	11.4	10	7.0	31	---	380	8.0	5.0	25	86
3/19	3440	45	9.2	3	6.8	32	---	300	5.7	5.2	16	45
3/25	1900	51	8.3	70	7.1	41	---	440	8.0	5.6	27	83
3/30	1750	60	7.2	85	6.9	41	---	440	6.1	2.4	27	110.0
4/4/63	1080	62	5.3	35	7.0	27	---	500	8.0	2.5	35	166.7
4/16	330	80	2.46	20	6.2	7	---	780	6.8	5.5	49	373.4
4/22	1490	64	5.0	58	7.1	44	---	380	6.6	4.6	23	58.3
4/29	484	74	3.7	23	7.2	24	---	730	6.1	3.2	73	246.7
5/5/63	484	82	4.4	19	6.5	7	---	680	3.7	1.8	44	236.7
5/9	400	95	3.28	7	6.6	10	---	680	3.4	0.7	56	293.4
5/17	394	89	1.85	242	6.4	6	---	800	9.3	2.7	55	333.4
5/23	394	79	2.40	21	6.5	37	---	760	7.3	2.5	53	306.7
5/24	364	83	3.00	18	6.5	36	---	800	7.6	2.2	54	346.7

TABLE NO. 6(a)
MAHONING RIVER AT LOWELLVILLE
(Lowellville Bridge Cont'd.)

Date Sampled	Flow* c.f.s.	Temp. °F.	D.O. mg/1	Phenol p.p.b.	pH	Total Alkalinity mg/1	Total Acidity mg/1	Con-ductivity µmhos/cm	Total** Iron mg/1	Ferrous** Iron mg/1	Chlorides mg/1	Sulfates mg/1
6/6/63	484	99	2.82	17	6.0	4	---	790	7.5	0.2	50	333.4
6/10	760	93	4.2	20	6.9	22	---	650	0.2	0.2	34	200.0
6/22	458	90	3.7	14	6.8	5	---	750	1.8	1.5	46	300.1
6/29	498	99	3.09	14	6.1	15	---	640	2.0	0.1	49	201.3
7/5/63	484	95	4.0	12	6.3	10	---	580	0.9	0.4	43	226.7
7/16	539	93	7.6	9	7.5	8	---	650	1.4	0.7	43	153.4
7/22	590	90	2.82	7	7.8	21	---	600	4.8	2.7	38	166.7
7/28	546	94	4.5	9	7.8	42	---	620	0.7	0.5	37	150.0
7/31	575	92	3.7	13	6.8	29	---	570	2.3	1.4	37	163.4
8/13/63	539	87	4.5	11	6.6	31	---	600	3.2	1.3	38	166.7
8/16	445	92	4.9	10	6.8	45	---	580	1.6	0.5	40	180.0
8/26	426	89	4.5	8	6.7	48	---	620	5.0	2.5	39	220.0
9/2/63	364	87	4.9	19	6.6	4	---	710	2.0	0.0	42	240.1
9/9	376	90	3.9	18	7.0	8	---	730	1.1	0.0	42	266.7
9/22	309	79	4.4	1	6.8	45	---	770	1.8	0.5	47	273.4
9/30	309	83	4.9	9	7.3	24	---	780	1.1	0.7	43	213.4
10/6/63	314	78	4.2	10	7.1	9	---	800	1.1	0.9	56	233.4
10/14	294	86	3.48	5	6.7	7	---	860	0.6	0.0	61	353.4
10/27	281	86	4.0	9	6.8	51	---	850	5.7	0.7	60	320.1
10/29	289	78	2.2		6.8	41	---	820	9.0	0.0	57	340.1
11/11/63	340	70	4.1	54	6.4	6	---	760	1.1	0.5	53	286.7
11/19	285	76	5.0	14	6.1	13	---	920	14.3	13.0	56	440.1
11/21	289	75	4.5	14	6.7	8	---	820	1.1	0.5	55	313.4
11/22	281	74	3.28	14	6.5	27	---	860	2.3	0.7	49	360.1
11/29	590	63	2.40	162	7.1	83	---	600	10.0	9.8	41	173.4
12/16/63	227	59	3.9	38	8.0	5	---	1040	4.6	0.9	82	426.8
12/29	252	53	4.4	86	7.2	51	---	900	2.0	0.5	73	266.7
12/30	242	58	5.4	29	8.0	19	---	900	1.4	0.7	75	273.4

TABLE NO. 6(b)

STREAM WATER QUALITY - 1964

MAHONING RIVER BASIN

MAHONING RIVER AT LOWELLVILLE
(Lowellville Bridge)

Date Sampled	Flow* c.f.s.	Temp. °F.	D.O. mg/1	Phenol p.p.b.	pH	Total Alkalinity mg/1	Total Acidity mg/1	Conductivity µmhos/cm	Total** Iron mg/1	Ferrous** Iron mg/1	Chlorides mg/1	Sulfates mg/1
1/5/64	285	58	5.7	38.1	7.2	78	--	950	2.9	0.9	85	313
1/8	281	62	3.9	114.2	6.5	31	--	980	10.5	1.6	95	400
1/18	264	60	3.6	352.2	6.7	76	--	960	6.8	2.0	97	340
1/26	1830	40	5.9	61.9	7.8	82	--	510	40.1	25.0	49	173
2/2/64	336	57	6.6	485.5	7.5	67	--	760	9.1	5.2	63	247
2/12	336	57	6.6	540.1	6.7	40	--	750	2.3	1.4	68	283
2/18	295	64	4.4	47.6	6.5	24	--	980	11.6	4.3	102	427
2/24	276	61	3.6	104.7	6.9	74	--	1050	4.1	2.0	102	413
2/29	304	66	5.1	39.7	7.2	91	--	1020	1.4	1.4	90	373
3/3/64	810	62	5.4	166.7	6.6	45	48	790	5.5	0.9	31	200
3/14	2300	49	9.2	71.8	7.2	28	11	380	38.4	1.8	76	87
3/20	1760	49	8.9	61.9	7.1	44	25	465	12.5	1.6	33	103
3/28	1020	56	7.6	99.6	7.0	44	26	440	7.5	0.7	35	93
3/30	754	54	5.9	104.7	7.0	28	38	630	13.7	1.6	62	250
4/18/64	674	76	2.7	14.3	6.1	10	48	610	7.3	6.2	45	233
4/21	5040	57	8.6	47.6	9.0	87	0	380	9.1	7.1	30	92
4/26	2810	63	6.2	52.4	7.4	46	10	340	9.1	4.8		92
4/30	5450	59	4.5	14.3	7.8	73	3	360	6.9	5.9	22	87
5/7/64	786	85	4.4	9.5	7.5	58	8	570	2.1	0.7	39	173
5/11	746	80	4.7	9.5	7.0	42	9	460	3.2	2.1	41	140
5/17	1020	75	5.7	4.3	7.7	54	4	410	0.5	0.3	28	103
5/31	413	84	4.1	7.1	7.7	56	5	720	1.4	0.3	57	287

TABLE NO. 6(b)

MAHONING RIVER AT LOWELLVILLE
(Lowellville Bridge Cont'd.)

Date Sampled	Flow* c.f.s.	Temp. °f.	D.O. mg/1	Phenol p.p.b.	pH	Total Alkalinity mg/1	Total Acidity mg/1	Conductivity µmhos/cm	Total** Iron mg/1	Ferrous** Iron mg/1	Chlorides mg/1	Sulfates mg/1
6/6/64	486	91	2.6	9.5	7.0	29	12	670	1.4	0.8	53	287
6/11	401	96	3.4	4.8	7.1	38	9	660	3.9	1.5	50	280
6/24	560	92	3.5	19.0	7.7	47	5	750	1.1	1.0	54	240
6/27	426	97	2.8	14.3	7.3	37	9	680	1.1	0.5	44	267
7/8/64	598	92	3.0	4.8	7.2	59	10	510	0.7	0.0	44	153
7/16	778	86	3.5	4.8	6.7	20	10.5	580	2.5	2.3	41	233
7/26	605	97	4.9	9.5	7.6	42	6	630	3.0	2.8	44	173
7/28	1100	97	4.2	14.3	7.3	25	7	600	1.8	1.6	43	213
7/31	545	84	2.7	9.5	6.8	26	7.5	600	3.9	3.0	43	233
8/4/64	674	89	4.4	14.3	7.2	68	12	590	2.7	0.5	44	157
8/14	538	89	3.9	14.3	7.9	55	8.0	590	2.3	0.5	55	213
8/22	898	89	2.6	4.8	7.9	35	8.0	570	3.0	0.7	35	157
8/30	466	98	0.1	4.8	6.8	20	22	710	9.6	0.7	51	341
9/10/64	395	104	2.6	9.5	7.5	44	16.0	680	5.7	0.7	66	300
9/15	364	90	4.0	19.0	6.8	25	26.0	740	1.6	1.6	64	313
9/25	407	89	5.0	----	6.1	12	64.0	840	22.5	9.1	60	333
9/29	314	88	4.4	0	5.2	5.0	25	820	33.9	1.1	65	360
10/2/64	Data	93	3.0	4.7	6.4	16.0	26	800	10.4	0.9	62	320
10/6	NA	--	3.7	23.8	6.6	24.0	28	820	3.0	2.0	72	340
10/23	"	83	4.5	28.5	6.6	25.0	50	890	8.0	0.9	70	386
10/27	"	87	4.0	9.5	4.4	0	119	1040	6.8	2.7	73	366
10/30	"	86	2.2	28.5	6.7	42	27	810	0.9	0.5	62	353
11/6/64	"	86	3.5	18.0	6.5	6	112	980	6.8	6.1	73	500
11/12	"	87	3.2	14.0	5.9	8	44	725	6.1	3.8	68	386
11/20	"	73	3.7	4.8	6.7	22	35	840	3.6	2.5	68	373
11/24	"	77	3.6	24.0	6.2	15	43	910	10.2	3.6	70	407
12/4/64	"	70	2.3	19.0	7.7	84	12	720	0.9	0.7	80	240
12/11	"	75	2.1	95.2	6.9	51	28	880	1.1	0.9	95	
12/14	"	64	5.4	28.6	7.2	58	20	730	1.1	0.9	69	
12/23	"	74	3.5	47.6	6.6	22	26	865	0.7	---	91	
12/29	"	59	6.4	290.4	6.9	59	33	635	4.3	2.3	54	

NOTES: * Provisional Records, U.S. Geological Survey Data.

** Iron analyses conducted on unfiltered samples.

TABLE NO. 7

SUMMARY OF ORGANIC POLLUTION LOADS - MUNICIPAL

Municipality or Political Sub.Div.	1960 Pop.	Date Placed in Operation	Design Basis Flow MGD.	Design Basis Pop.	Current Operating Data Flow MGD	Current Operating Data Population Equiv. After Treatment	Type of Treatment Facilities*
Lowellville	2055	1959	.35	3500	.167	645	I. + Cl_2
Struthers	15631	1961	2.5	31,200	1.305	5270	I. + Cl_2
Campbell	13406	1958	2.5	25,000	2.348	9150	I. + Cl_2
Youngstown	166,689	1965	50.0	218,000			I. + Cl_2
Girard	12,997	1963	1.8	18,000	.898	3180	I. + Cl_2
McDonald	2,727	1959	.61	5,230	.198	782	I. + Cl_2
Niles	19,545	1961	3.0	27,000	2.07	9100	I. + Cl_2
Warren	59,648	1962	13.5	90,000	7.52	47,300	I. + Cl_2
Newton Falls	5,038	1960	1.0	7,000	.119	1,160	P. + Cl_2
Milton SD #11	1,139+	1960-1963	.47	3,200	.075	62	Aerobic
Alliance	28,362	1929-1960	4.7	36,400	3.29	8,890	T.F.
Trib.							
Sebring	4,439	1935-1946	.5	5,000	.203	140	T.F.
Beloit	877	-	-	-	-		None-Preparing plans
Canfield	3252	1957-1962	.50	5,000	.317	350	A.S. + Cl_2
Columbiana	4164	1932-1964	.80	8,000	.339	322	A.S.
Poland	2766	-	-	-			Trib. to Struthers
Cortland	1957	1940-1956	.22	2,200	.203	173	A.S.
Windham	3777	1943-1953	.45	4,500	.184	335	T.F. + Cl_2
Garrettsville	1662	1961	.15	2,000	.089	236	T.F.
Hiram	1011	1954	.10	1,000	.062	E.-100	T.F.
Mahoning Co.							
Poland SD #4 Linsenbigler Subdiv.		1960	.031	310	1964 .018	4	Aerobic
West Austintown SD #13 College Park. Est.		1960-1962	.120	1200	.064	70	Aerobic
Burgess Run SD #23 S. Poland Hts.		1957	.080	800	.024	3	Aerobic
Burgess Run Hts.		1958	.040	400	.021	3	"

TABLE NO. 7

SUMMARY OF ORGANIC POLLUTION LOADS - MUNICIPAL Cont'd.

Municipality or Political Sub.Div.	1960 Pop.	Date Placed in Operation	Design Basis		Current Operating Data		Type of Treatment Facilities *
			Flow MGD	Pop.	Flow MGD	Pop. Equiv. After Treatment	
Park, San. Dist #29							
Boardman S.T.P.		1964	5.00	50,000	.447	105	Aerobic
Park Site Estates		1958-60	.036	360			"
Sherwood Forest Sub.		1960-63	.039	390	.032	21	"
Trumbull Co.							
Warren-Champion S.D.							
Subdist. 1A (Durst)		1961	.040	400		100	Aerobic + Cl_2
" 1B (Kuszmaul)		1958-61	.090	900	-	36	Aerobic
" 1C (Lyndhurst)		1960	.024	240	-	21	"
" 1D (Snethkamp)		1963	.015	150	-	10	"
Howland S.D. #3							
Subdist A		1924	.120	1200 E.	.044	160	P
" B (Victoria Terr)		1924	0.16 E	160 E.			"
" C (Fairlawn Hts.)		58-63	.120	1200	-	-	Aerobic
Howland S.D. #6							
6A (Woodmere Allot)		56-61	.080	800	-	270	Aerobic
6B (Venice Allot)		1960	.050	500	-	50	"
Howland S.D. #8							
Hoffman Allot.		1958	.0256	256	-	-	S.F.
Hubbard-Liberty S.D.							
Subdist. 3C-(N. Park Est.)		1962	.104	1040	.057	45	Aerobic + Cl_2

TABLE NO. 7

SUMMARY OF ORGANIC POLLUTION LOADS - MUNICIPAL Cont'd.

Municipality or Political Sub.Div.	1960 Pop.	Date Place in Operation	Design Basis		Current Operating Data		Type of Treatment Facilities*
			Flow MGD	Pop.	Flow MGD	Pop.Equiv. After Treatment	
Weathersfield Twp. SD (Oakview Manor)		1958	.120	1200	-	25	Aerobic
Mineral Ridge S.D.		1962	.200	2000	.061	300	"
Vienna S.D. Subdist. #1 (Brunswick Sub.)		1962	.020	200	-	4	Aerobic + Cl_2

Notes:

* I. = Intermittent
P. = Primary
A.S. = Activated Sludge
S.F. = Sand Filter
T.F. = Trickling Filter
Cl_2 = Chlorination
E. = Estimated

TABLE NO. 8

SUMMARY OF ORGANIC POLLUTION LOADS - INDUSTRIAL

Location	Name of Industry	Type of Waste	Population Equivalent Before Treatment	Population Equivalent After Treatment	Type of Treatment	Remarks
Alliance	John Liber Co.	Slaughtering & Pack.	200	10	Sand Filters	
Girard	Ohio Leather Co.	Tannery	5,000	2,800	Settling	Eff. to city sewers.
Girard	Unger Bros. Inc.	Slaughtering & Pack	2,000	1,800	Settling	Eff. to Cit sewers.
Youngstown	Zimmerman Packing Co.	Meat Packing	200	15	Sand Filters	
Youngstown	D & B Products Co.	Rendering	200	200	Screens	To city sewe (U.C.)
TRIB. Mahoning Co. Smith Twp.	Purity Dairy Co.	Dairy	1,400	25	Aerobic Dig.	Under Board Action
Alliance	Barnes Provision Co.	Slaughtering & Pack.	500	12	Sand Filters	
Trumbull Co. Champion Twp.	McAllister Dairy	Dairy	1,250	130	Lagoons	
Mahoning Co. Austintown Twp.	Lloyd Pack Co.	Meat Packing	200	5	Sand Filters	

TABLE NO. 9(a)

STEEL MILL ACID, ALKALI AND IRON WASTES

1. Babcock and Wilcox, Tubular Products Division, Alliance.

   Waste acid iron pickle liquors hauled away. Neutralization and clarification of first rinse waters.

2. Copperweld Steel Company, Trumbull County.

   Neutralization and clarification of waste acid iron pickle liquors and rinse waters.

3. Pittsburg Steel Company, Thomas Strip Division, Trumbull County.

   Neutralization and clarification in a lagoon of waste acid iron pickle liquors. Company has been studying possibility of joint treatment of residual rinse waters with the city of Warren.

4. Sharon Steel Corporation, Brainard Steel Division, Trumbull County.

   Waste acid iron pickle liquors hauled away.

5. Republic Steel Corporation, Warren District, Warren.

   Waste acid iron pickle liquors and rinse waters partially neutralized with slaked lime before discharge.

6. Republic Steel Corporation, Warren District, Niles.

   Waste acid iron pickle liquors hauled to Republic Steel Corporation, Warren District, Warren.

7. Republic Steel Corporation, Youngstown District, Youngstown.

   Controlled discharge of waste acid iron pickling liquors.

8. United States Steel Corporation, McDonald Works, McDonald.

   Neutralization and clarification of waste acid iron pickle liquors and rinse waters with Open Hearth slag.

9. United States Steel Corporation, Ohio Works, Youngstown.

   Waste acid iron pickle liquors hauled to United States Steel Corporation, McDonald Works, McDonald for neutralization and clarification.

10. Youngstown Sheet and Tube Company, Brier Hill Plant, Youngstown.

    Neutralization and clarification of waste acid iron pickle liquors.

11. Youngstown Sheet and Tube Company, Campbell Plant, Campbell.

    Controlled discharge of waste acid iron pickle liquors from all units except for one Mesta pickler.

12. Youngstown Sheet and Tube Company, Struthers Plant, Struthers.

    Controlled discharge of waste acid iron pickle liquors.

TABLE NO. 9(b)

OTHER SOURCES OF ACID AND ALKALI WASTES.

1. Alliance Ware, Inc., Alliance.

   Neutralization and clarification of waste acid iron pickle liquors.

2. Transue & Williams Steel Forging Company, Alliance.

   Neutralization and clarification of waste acid iron pickle liquors.

3. Reactive Metals, Inc., Niles.

   Controlled discharge of waste acid pickling liquors. Detail plans for treatment, reuse, and disposal of acid wastes being prepared.

4. General Electric Company, Mahoning Glass Plant, Niles.

   Neutralization and clarification of acids. Precipitation of fluorides.

5. General Electric Company, Niles Glass Plant, Niles.

   Neutralization of acids, precipitation of fluorides, and vacuum filtration of sludges.

6. Raymond Concrete Pile Company, Youngstown.

   Controlled discharge of acids.

7. Union Carbide Corporation, Linde Company, Division, Acetylene Plant, Youngstown.

   Clarification of wastes and offsite disposal of acetylene sludges.

8. Jones & Laughlin Steel Corporation, Stainless Strip Division, Youngstown.

   Waste acids hauled away.

9. Fitzsimmons Steel Company, Inc., Youngstown.

   Controlled discharge of waste acid iron pickling liquors. Eighty percent of pickling operations eliminated by installation of dry cleaning methods.

10. The Wilkoff Company, Youngstown.

    Controlled discharge of waste acid iron pickle liquors.

11. Aluminum Color Industries, Lowellville.

    Anodizing acids hauled away. Controlled discharge of rinse waters.

TABLE NO. 9(c)

STEEL MILL SOLIDS - FLUE DUST.

1. Republic Steel Corporation, Warren District, Warren.

   Venturi-type gas washer installed on blast furnace, gas cooling water diverted, clarifier modified in 1963.

2. Republic Steel Corporation, Youngstown District, Youngstown.

   Clarifier designed to serve four blast furnaces washers. Only two blast furnaces are expected to be operated at one time in the future.

3. United States Steel Corporation, Ohio Works, Youngstown.

   Venturi-type gas washers installed on all blast furnaces which are expected to be used in the future. Cooling water diverted from settling basins. Regular settling basin cleaning schedule adhered to.

4. Youngstown Sheet and Tube Company, Brier Hill Plant, Youngstown.

   Cooling water diverted, settling basins baffled. Regular settling basin cleaning schedule adhered to. (Both blast furnaces at Brier Hill now out of service. Probably will not be returned to service.)

5. Youngstown Sheet and Tube Company, Campbell Plant, Campbell.

   Venturi-type gas washers installed on two blast furnaces. Installation of venturi-type gas washer to be made on the third furnace during 1965. Venturi-type gas washer to be installed on fourth blast furnace when the furnace is next relined. Cooling water diverted and dirty water discharged to existing settling basins. Regular settling basin cleaning schedule adhered to. Facilities for clarification and recycling of clarified wastewaters now under construction -- to be completed in 1965 - will replace existing settling basins.

TABLE NO. 9(d)

STEEL MILL SOLIDS - MILL SCALE

1. American Steel Foundries, Transportation Equipment Division, Alliance.

   Chemical coagulation and clarification provided. Offsite disposal of sludge. Major portion of wastewater recirculated.

2. Copperweld Steel Company, Trumbull County.

   Clarification provided. Scale recovery.

3. Republic Steel Corporation, Warren District, Warren.

   Dry drags, settling pond, and partial reuse of wastewater provided at new strip mill. Settling pond provided for another mill operation. Present blooming mill has inadequate facilities. Disposition of blooming mill being determined. Oil recovery provided on all new facilities.

4. Republic Steel Corporation, Youngstown District, Youngstown.

   New scale recovery facilities installed at three mills. All other mills have adequate treatment except the tube mill. Tube mill being replaced by a new continuous butt weld mill. Adequate facilities will be provided. Oil recovery on all new facilities.

5. United States Steel Corporation, McDonald Works, McDonald.

   Clarification and oil recovery for entire plant provided.

6. United States Steel Corporation, Ohio Works, Youngstown.

   Present recovery is by existing pits. Regular pit cleaning schedules adhered to. The two primary mills' rolling facilities will require modernization if the mill is to remain competitive. Scale and oil recovery facilities will be included in any modernization program.

7. Youngstown Sheet and Tube Company, Brier Hill Plant, Youngstown.

   Three scale pits provided. One scale pit on a recycle system. Regular scale pit cleaning schedules adhered to.

8. Youngstown Sheet and Tube Company, Campbell Plant, Campbell.

   New mills have new scale recovery facilities. All other existing scale pits modified for effective removal of scale and oil except the seamless tube mill. Detail plans of scale and oil recovery facilities for seamless tube mill approved and facilities scheduled for construction in 1966.

9. Youngstown Sheet and Tube Company, Struthers Plant, Struthers.

   All scale pits modified for recovery of scale and oil.

TABLE NO. 9(e)

OTHER SOURCES OF SOLIDS

1. Fly Ash.

    Ohio Edison Company, Niles.
    Clarification in lagoons provided.

2. Coal Washings.

    Peterson Coal Company, Portage County.
    Clarification ponds provided.

3. Sand and Gravel.

    a. Harbison-Walker Refactories, Inc., Portage County.
    Clarification in lagoons provided.

    b. Penna. Glass Sand Company, Industrial Silica Division, Portage County.

    Clarification in lagoons provided.

4. Clay.

    American Fire Clay Company, Mahoning County.

    Clarification lagoon provided.

TABLE NO. 9(f)

METAL FINISHING

1. Rockwell-Standard Corporation, Bumper Division, Newton Falls.

   Reduction of chromium with strong waste acid iron pickle liquors or ferrous sulfate; neutralization of reduced chromium wastes along with nickel and acid copper wastes; and clarification of all wastes in a lagoon.

2. Pittsburgh Steel Company, Thomas Strip Division, Trumbull County.

   Oxidation of cyanide bearing rinse waters. A program of installing counter-current rinse tanks on brass, copper, nickel, and galvanize plating lines is complete. Company has been studying possibility of joint treatment of residual rinse waters with the city of Warren.

3. General Motors Corporation, Packard Electric Division, Plant No. 10, Trumbull County.

   Copper reclaimed and chemical treatment provided for residual wastes and soap lubricants.

4. General Motors Corporation, Packard Electric Division, Plant No. 11, Trumbull County.

   Chromium, cyanides, copper wastes and acid wastes treated. Wastewater reused. (This plant has the operations formerly located in the Warren Plant).

5. Jones & Laughlin Corporation, Conduit Products Division, Niles.

   Oxidation of cyanides and precipitation of zinc provided. Acids from plating operations to be blended with previously treated cyanide wastes.

6. Jones & Laughlin Corporation, Stainless Strip Division, Youngstown.

   Counter-current rinsing, oxidation of cyanides and precipitation of metals provided.

7. Republic Steel Corporation, Warren District, Niles.

   No cyanides. Drag out of zinc and tin minimized with verticle take-up of strips.

8. Youngstown Sheet and Tube Company, Struthers Works, Struthers.

   Oxidation of cyanides and precipitation of zinc.

TABLE NO. 9(g)

COKE PLANTS AND TAR PLANTS

1. Coke Plants

   a. Republic Steel Corporation, Warren District, Warren.

      Closed coke quench system. All strong wastes tied into quench system. All light oil hauled to Republic Steel Corporation, Youngstown District, Youngstown for processing.

   b. Republic Steel Corporation, Youngstown District, Youngstown.

      Closed coke quench system. Still wastes and benzol plant wastes connected to quench system.

   c. Youngstown Sheet and Tube Company, Campbell Plant, Campbell.

      Closed coke quench system.

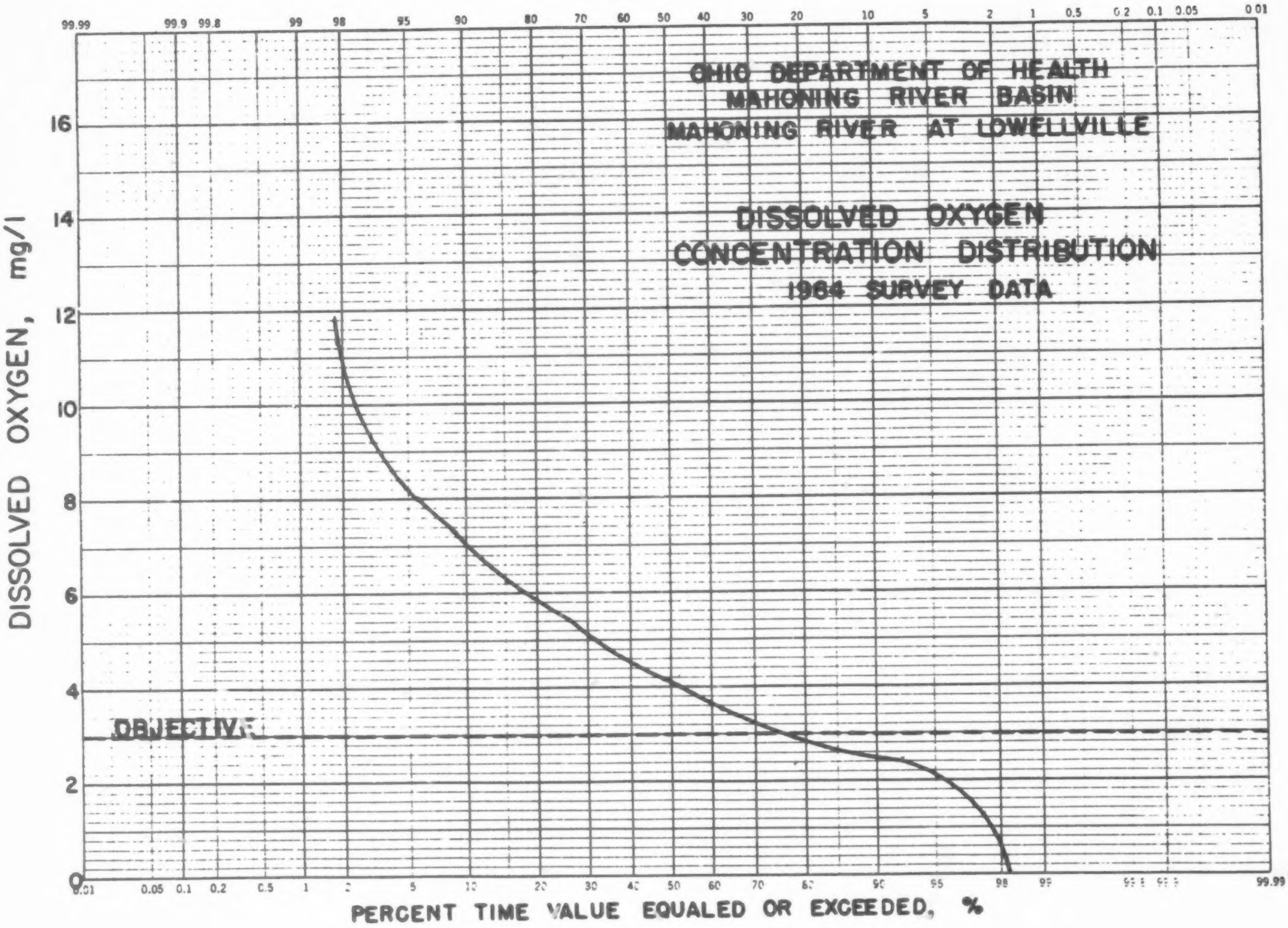
2. Tar Plants

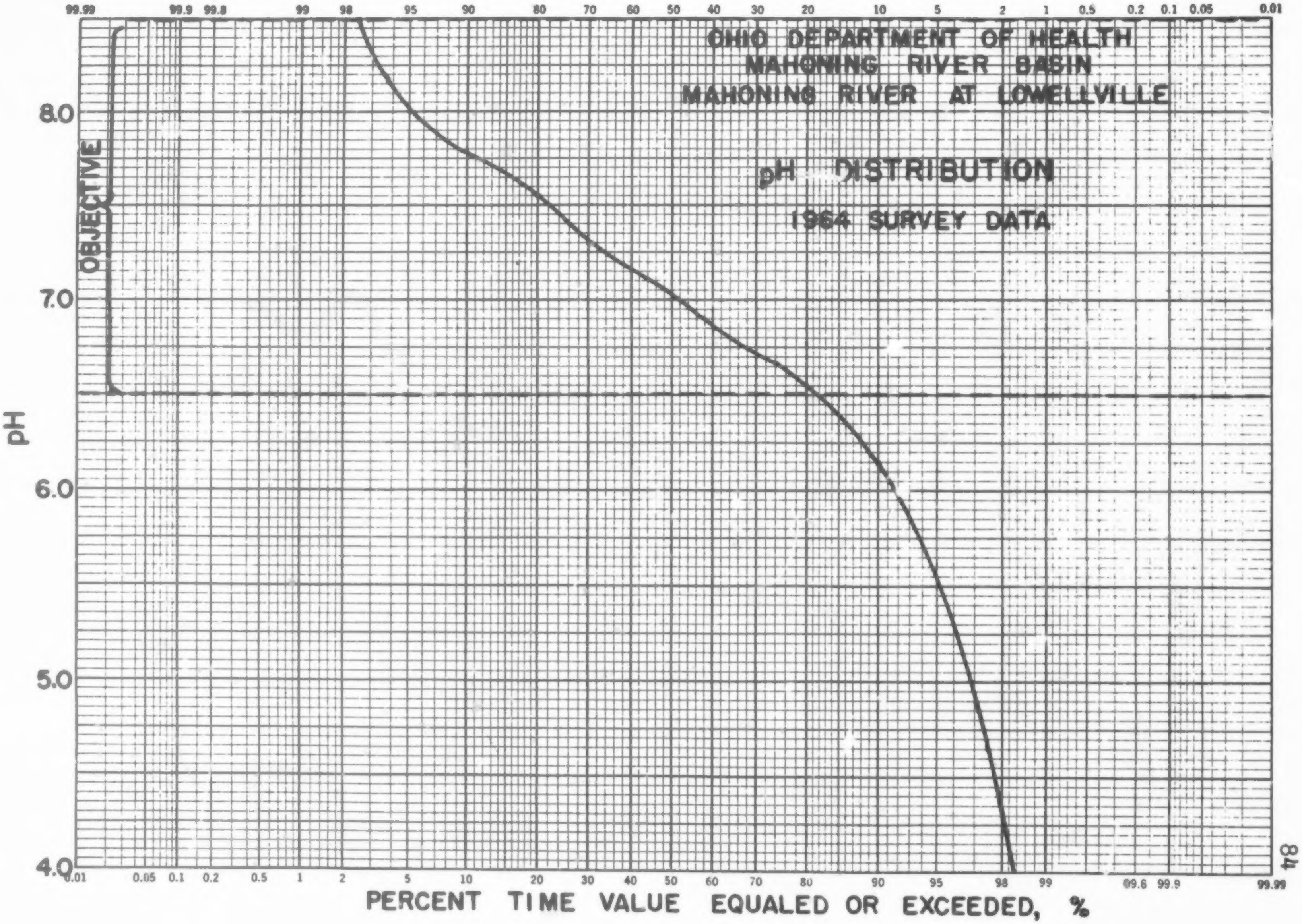
   a. Allied Chemical Corporation, Plastics Division, Youngstown Plant, Youngstown.

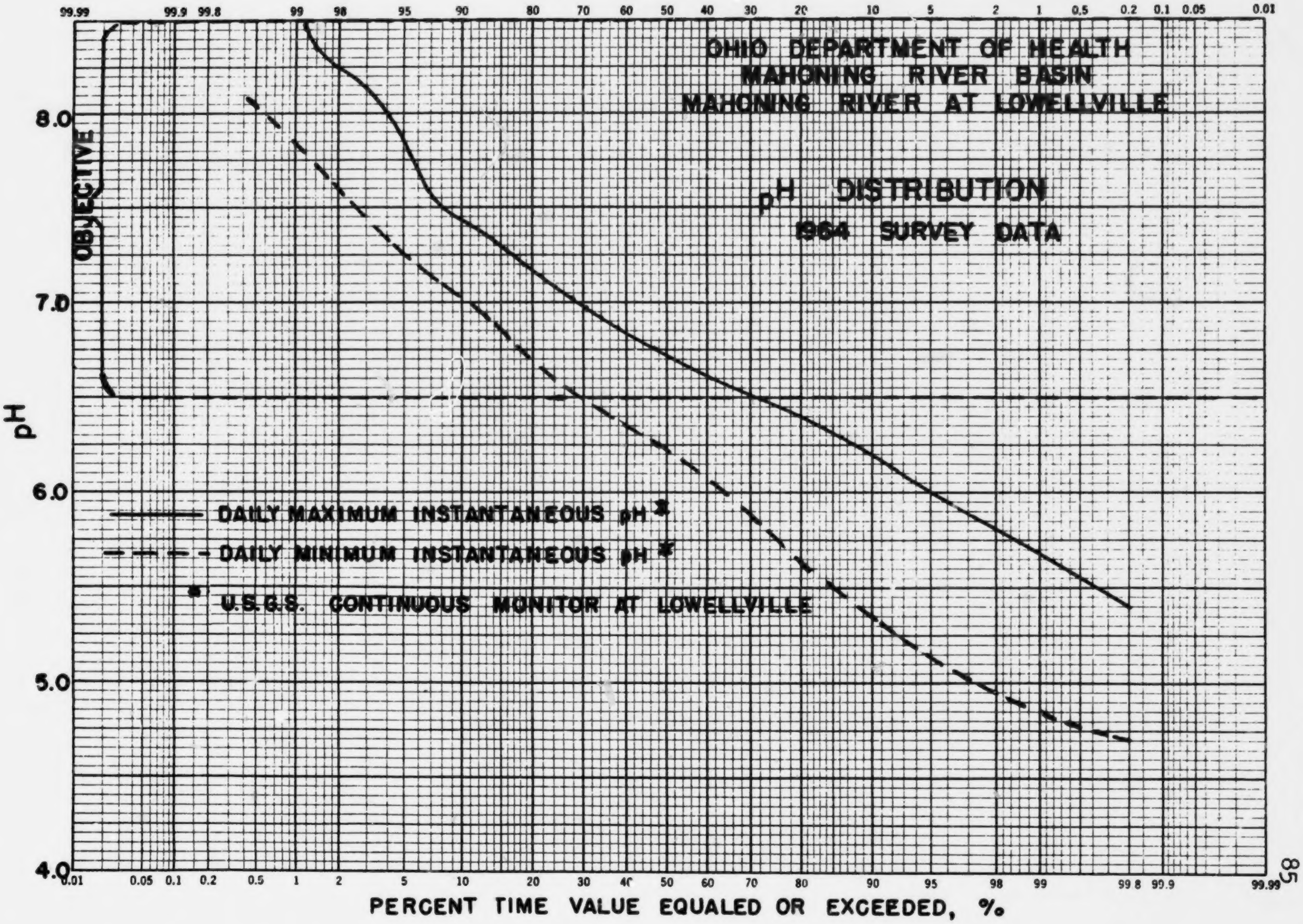
      Oil separator, flow equalization provided.

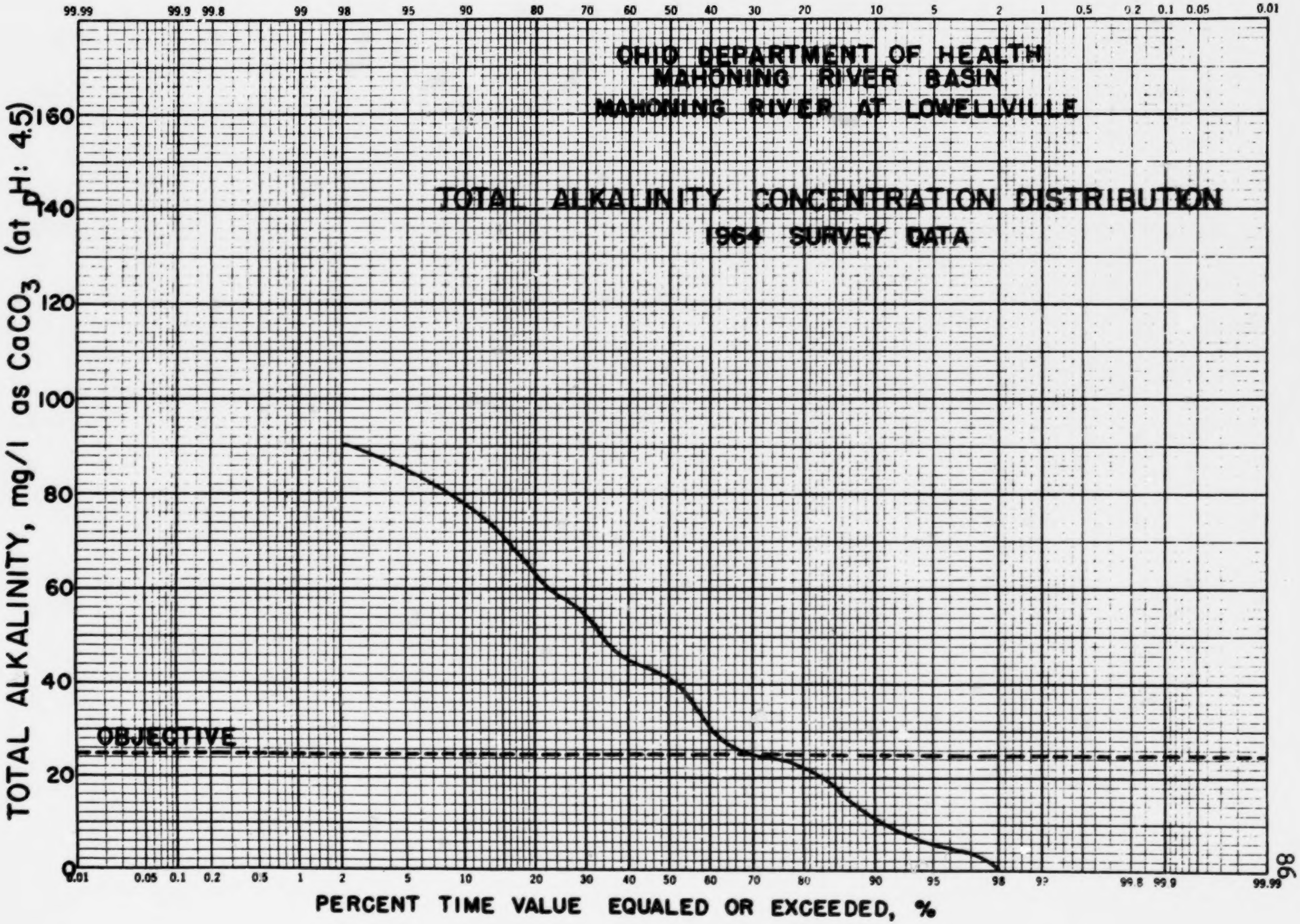
   b. Koppers Company, Inc., Tar Products Division, Youngstown Plant, Youngstown.

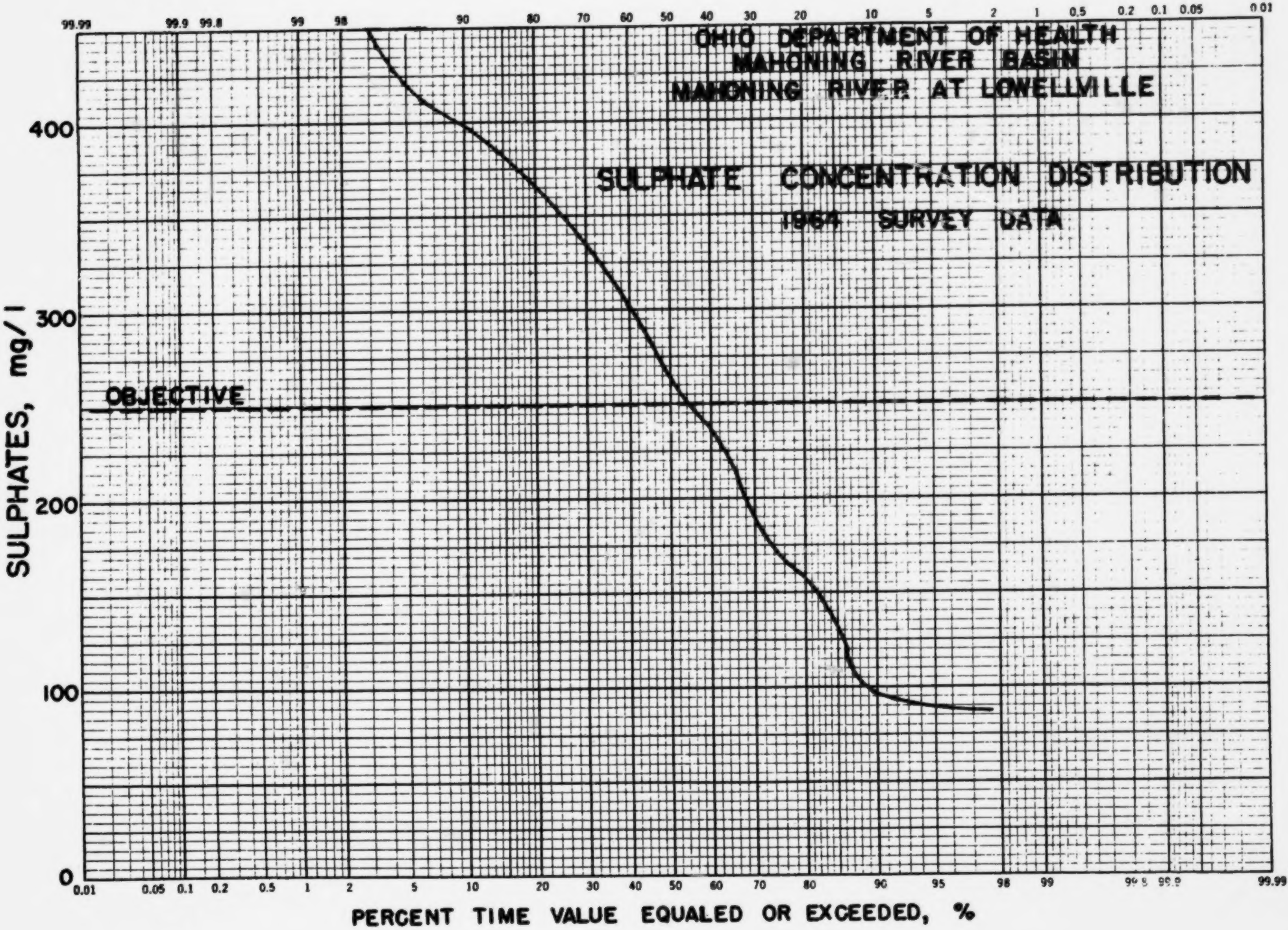
      Tar and oil separator and controlled discharge for effluent provided. To be connected to City of Youngstown sanitary sewerage system to remove effluent from small tributary.


OHIO DEPARTMENT OF HEALTH
MAHONING RIVER BASIN
MAHONING RIVER AT LOWELLVILLE
DISSOLVED OXYGEN
CONCENTRATION DISTRIBUTION
1964 SURVEY DATA
OBJECTIVE
DISSOLVED OXYGEN, mg/l
0
2
4
6
8
10
12
14
16
PERCENT TIME VALUE EQUALED OR EXCEEDED, %
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99


OHIO DEPARTMENT OF HEALTH
MAHONING RIVER BASIN
MAHONING RIVER AT LOWELLVILLE
pH DISTRIBUTION
1964 SURVEY DATA
OBJECTIVE
pH
8.0
7.0
6.0
5.0
4.0
99.99
99.9
99.8
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1
0.05
0.01
PERCENT TIME VALUE EQUALED OR EXCEEDED, %

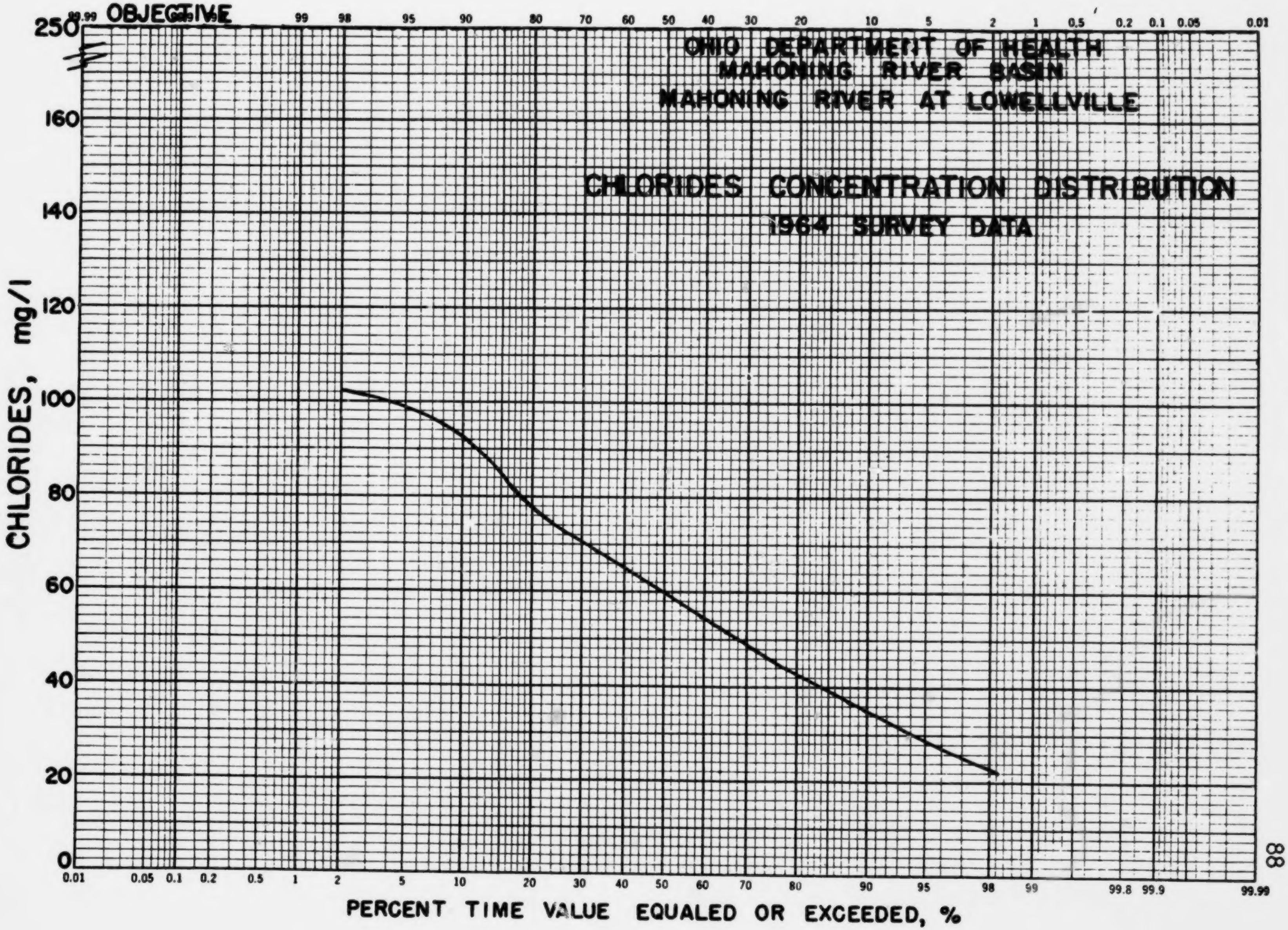

OHIO DEPARTMENT OF HEALTH
MAHONING RIVER BASIN
MAHONING RIVER AT LOWELLVILLE
pH DISTRIBUTION
1964 SURVEY DATA
OBJECTIVE
DAILY MAXIMUM INSTANTANEOUS pH *
DAILY MINIMUM INSTANTANEOUS pH *
* U.S.G.S. CONTINUOUS MONITOR AT LOWELLVILLE
pH
8.0
7.0
6.0
5.0
4.0
PERCENT TIME VALUE EQUALED OR EXCEEDED, %
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99


OHIO DEPARTMENT OF HEALTH
MAHONING RIVER BASIN
MAHONING RIVER AT LOWELLVILLE
TOTAL ALKALINITY CONCENTRATION DISTRIBUTION
1964 SURVEY DATA
OBJECTIVE
TOTAL ALKALINITY, mg/l as $CaCO_3$ (at pH: 4.5)
0
20
40
60
80
100
120
140
160
PERCENT TIME VALUE EQUALED OR EXCEEDED, %
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99



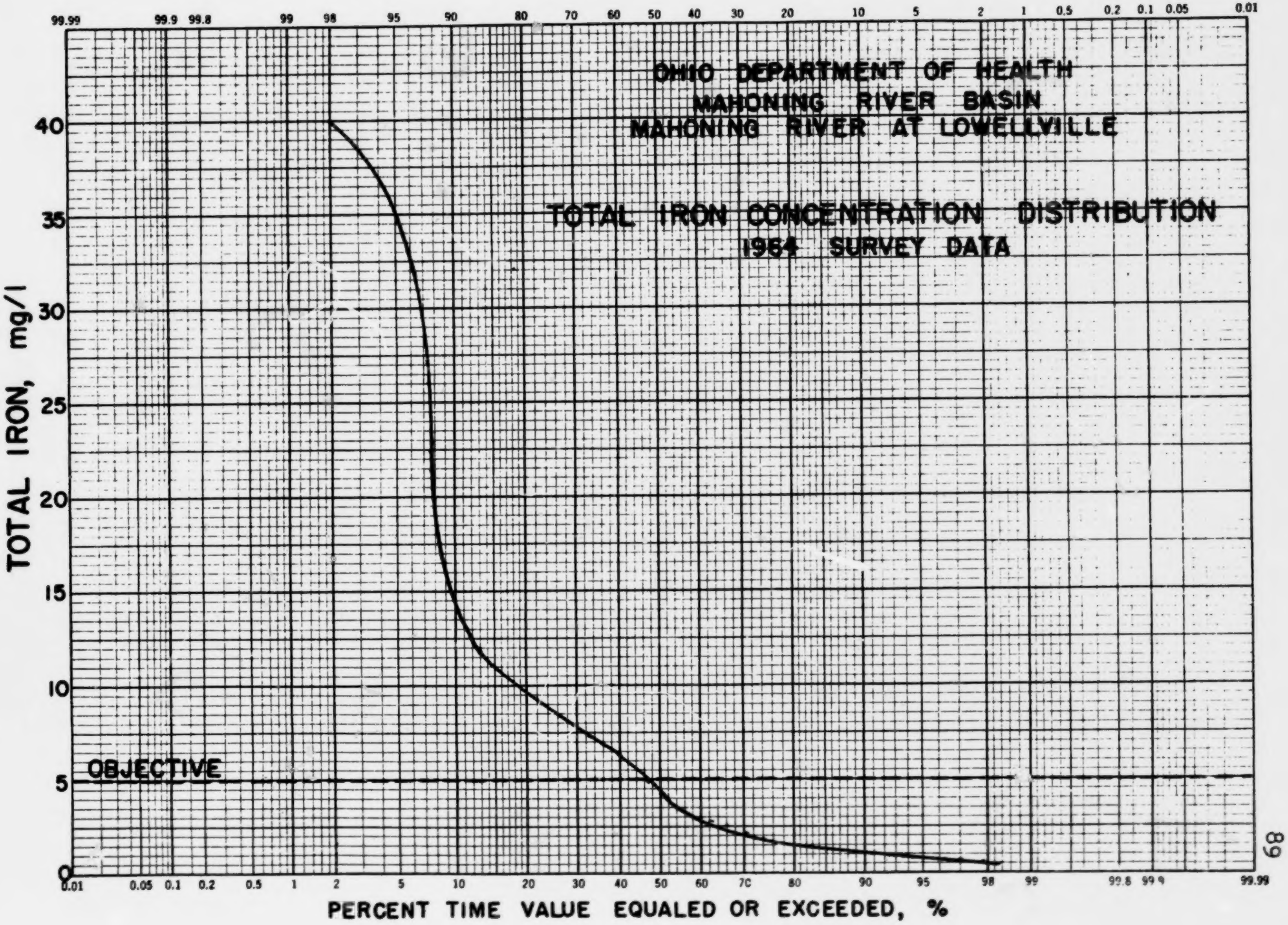
OHIO DEPARTMENT OF HEALTH
MAHONING RIVER BASIN
MAHONING RIVER AT LOWELLVILLE

SULPHATE CONCENTRATION DISTRIBUTION
1964 SURVEY DATA



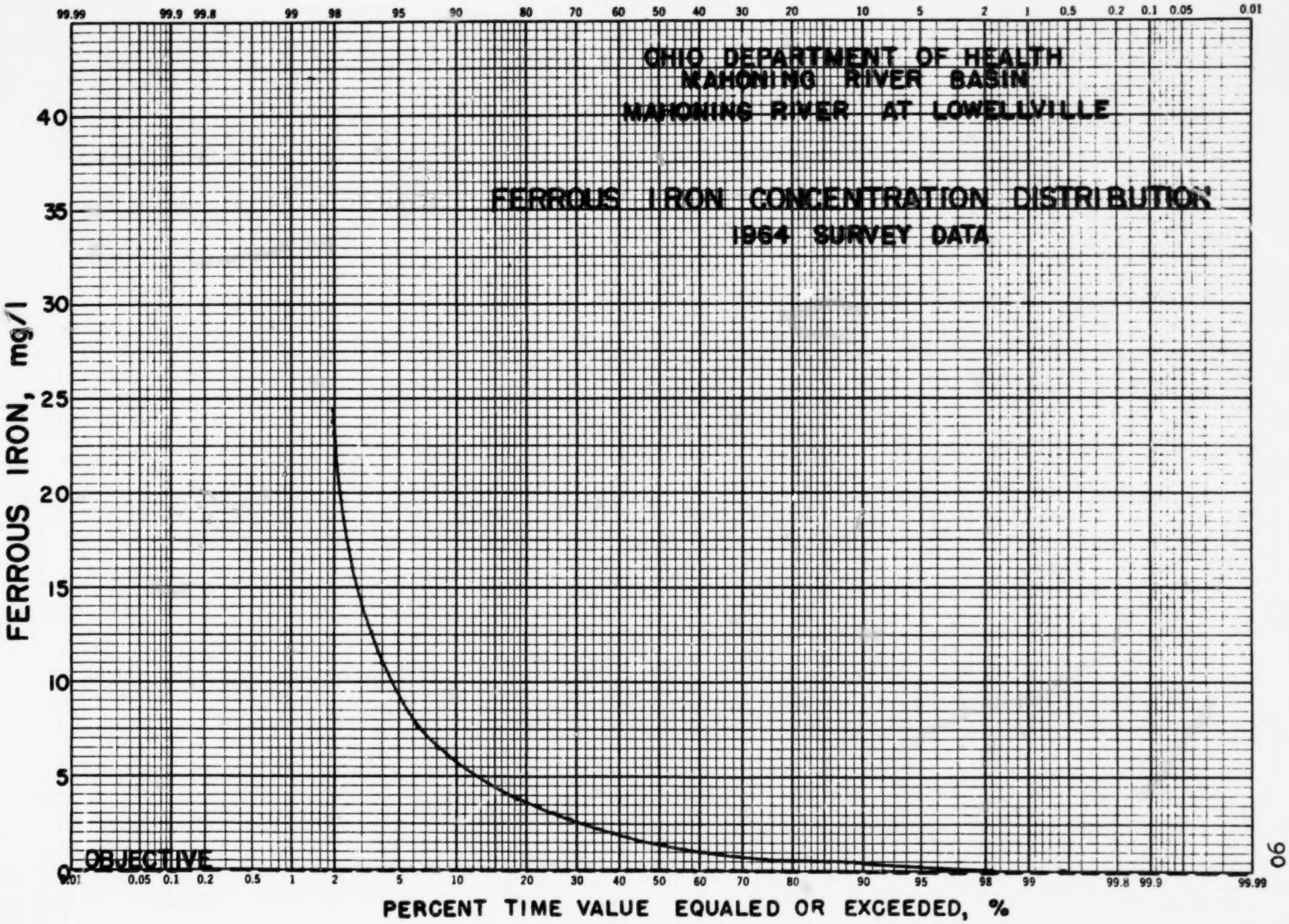
OHIO DEPARTMENT OF HEALTH
MAHONING RIVER BASIN
MAHONING RIVER AT LOWELLVILLE

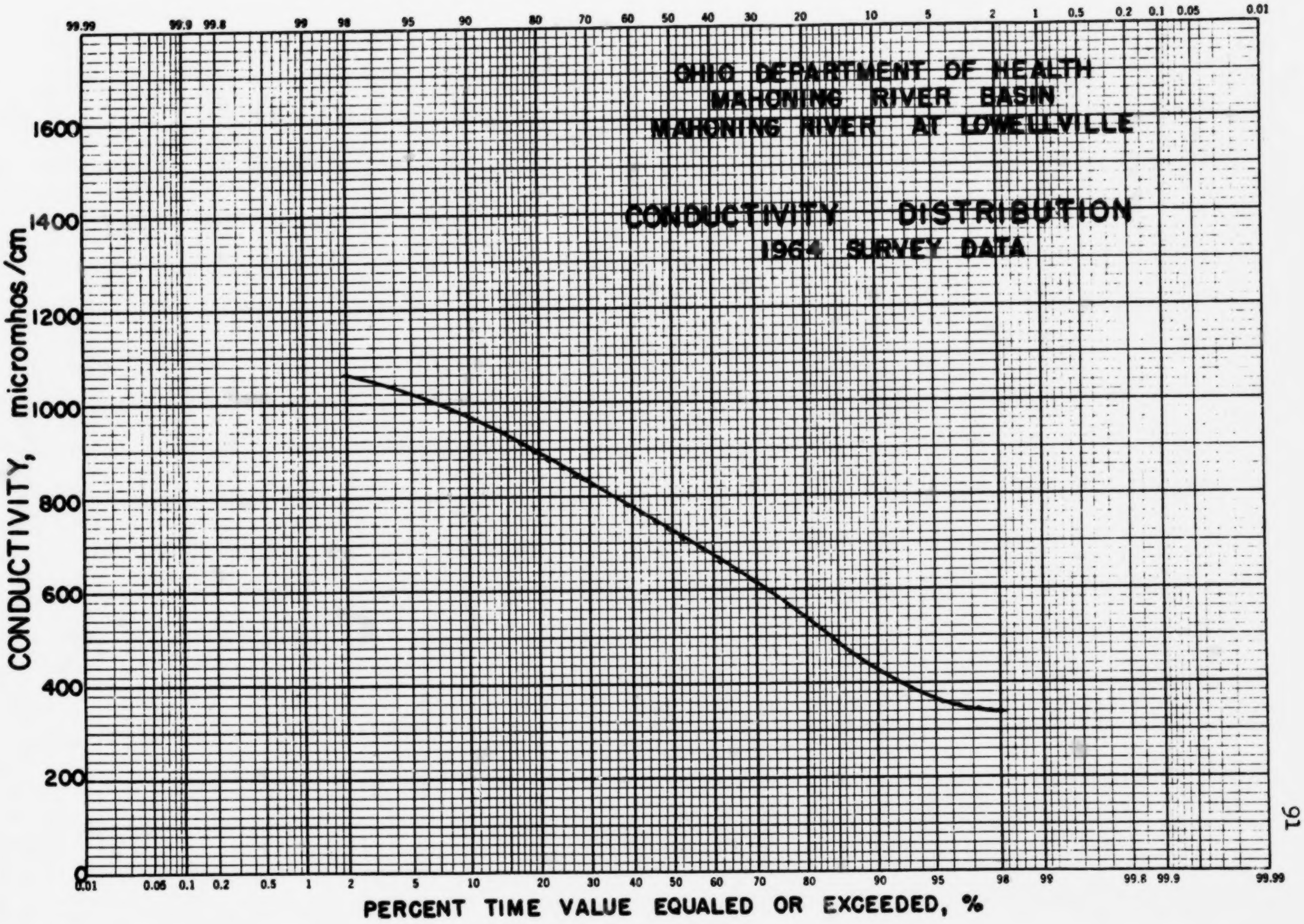
CHLORIDES CONCENTRATION DISTRIBUTION
1964 SURVEY DATA

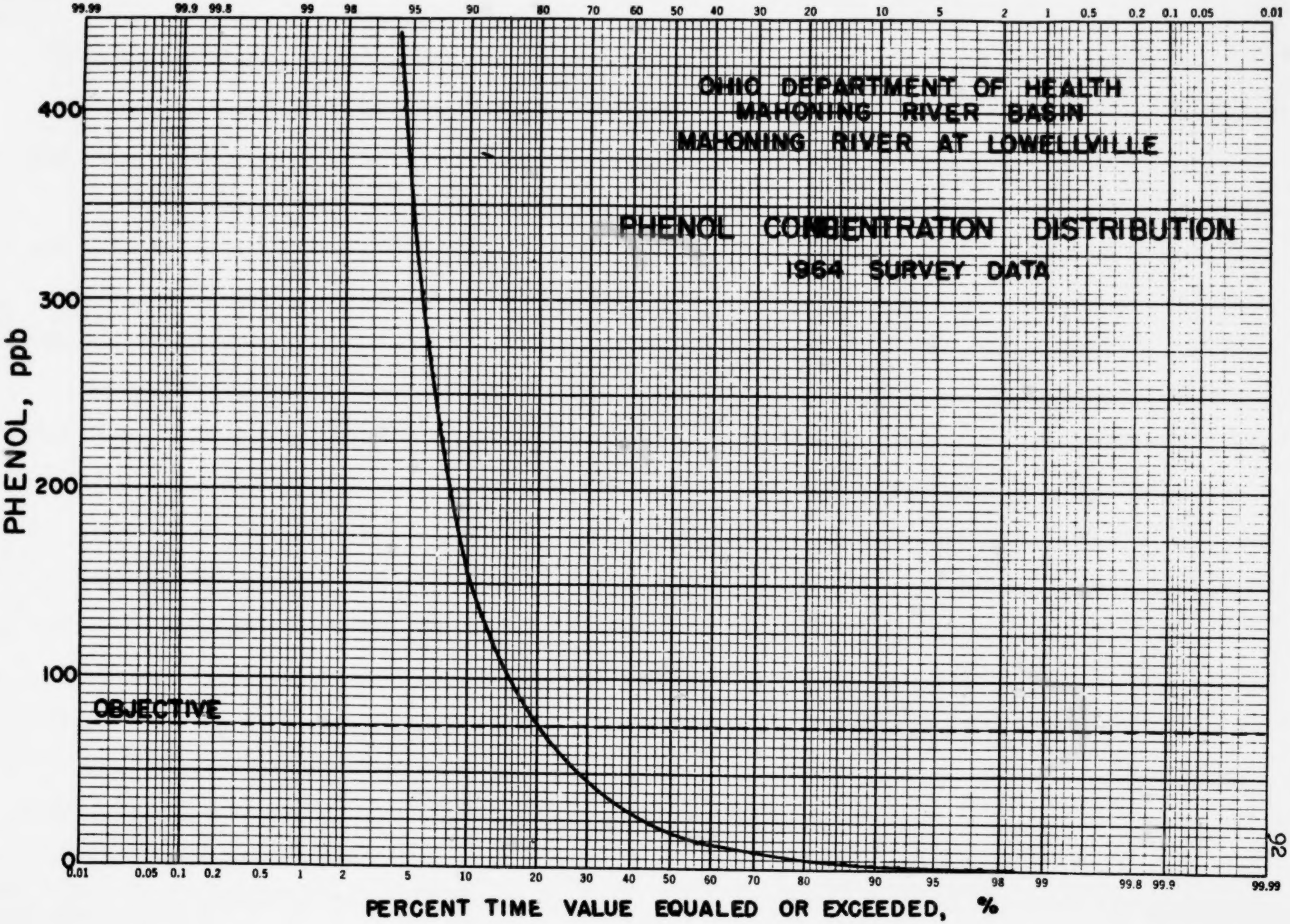


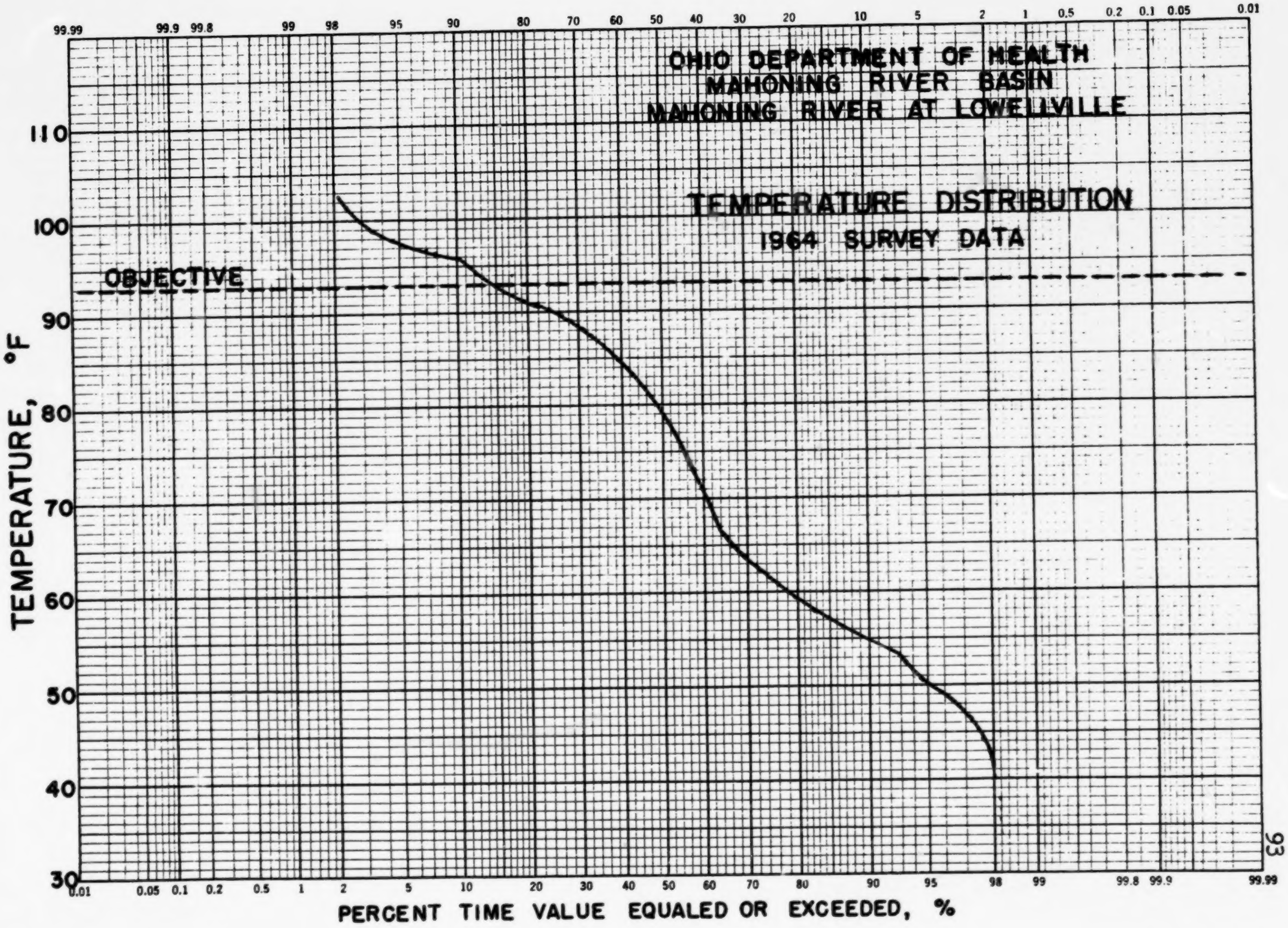
OHIO DEPARTMENT OF HEALTH
MAHONING RIVER BASIN
MAHONING RIVER AT LOWELLVILLE

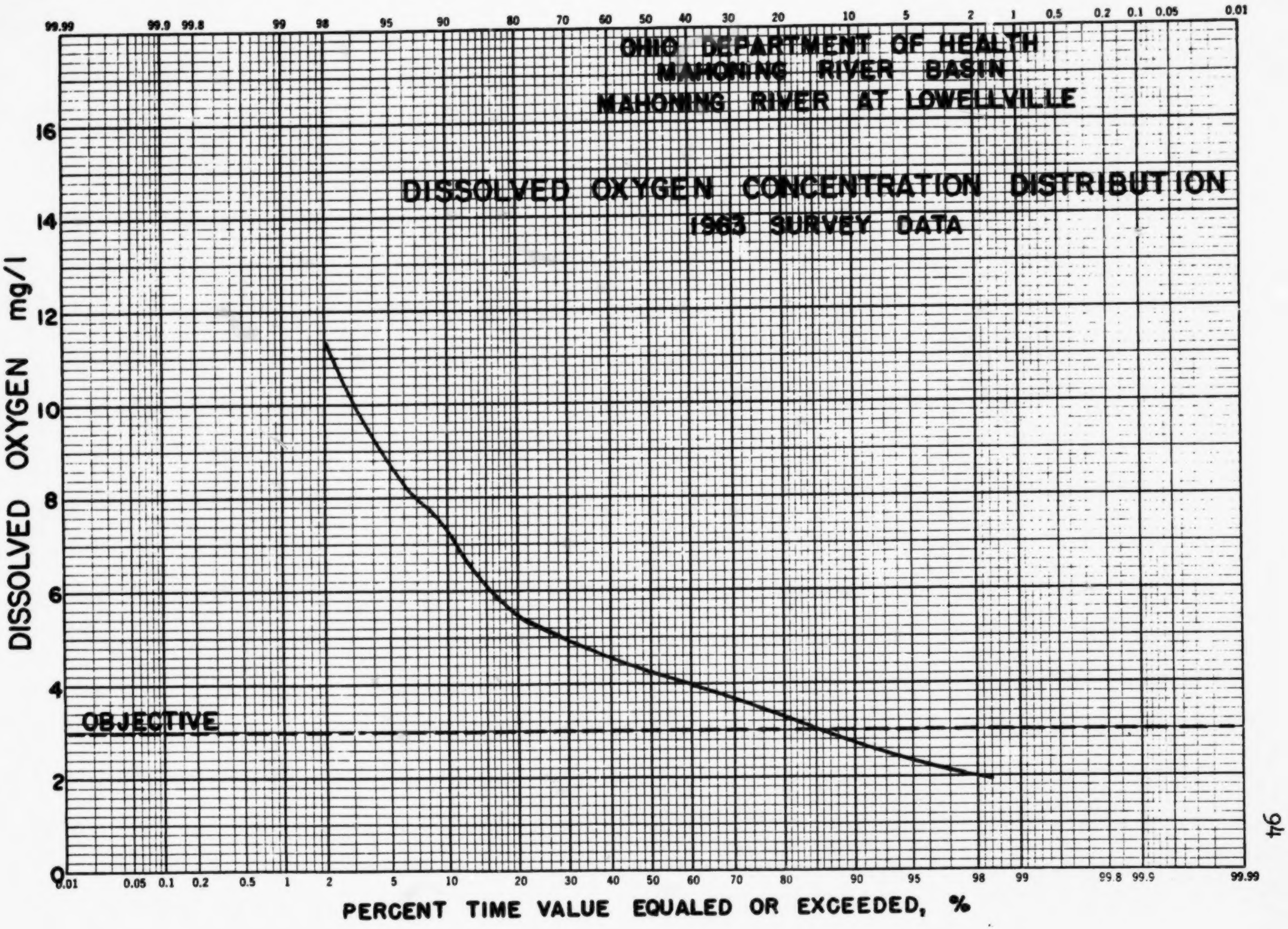
TOTAL IRON CONCENTRATION DISTRIBUTION
1964 SURVEY DATA


OHIO DEPARTMENT OF HEALTH
MAHONING RIVER BASIN
MAHONING RIVER AT LOWELLVILLE
FERROUS IRON CONCENTRATION DISTRIBUTION
1964 SURVEY DATA
FERROUS IRON, mg/l
0
5
10
15
20
25
30
35
40
OBJECTIVE
PERCENT TIME VALUE EQUALED OR EXCEEDED, %
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99


OHIO DEPARTMENT OF HEALTH
MAHONING RIVER BASIN
MAHONING RIVER AT LOWELLVILLE
CONDUCTIVITY DISTRIBUTION
1964 SURVEY DATA
CONDUCTIVITY, micromhos/cm
0
200
400
600
800
1000
1200
1400
1600
PERCENT TIME VALUE EQUALED OR EXCEEDED, %
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99

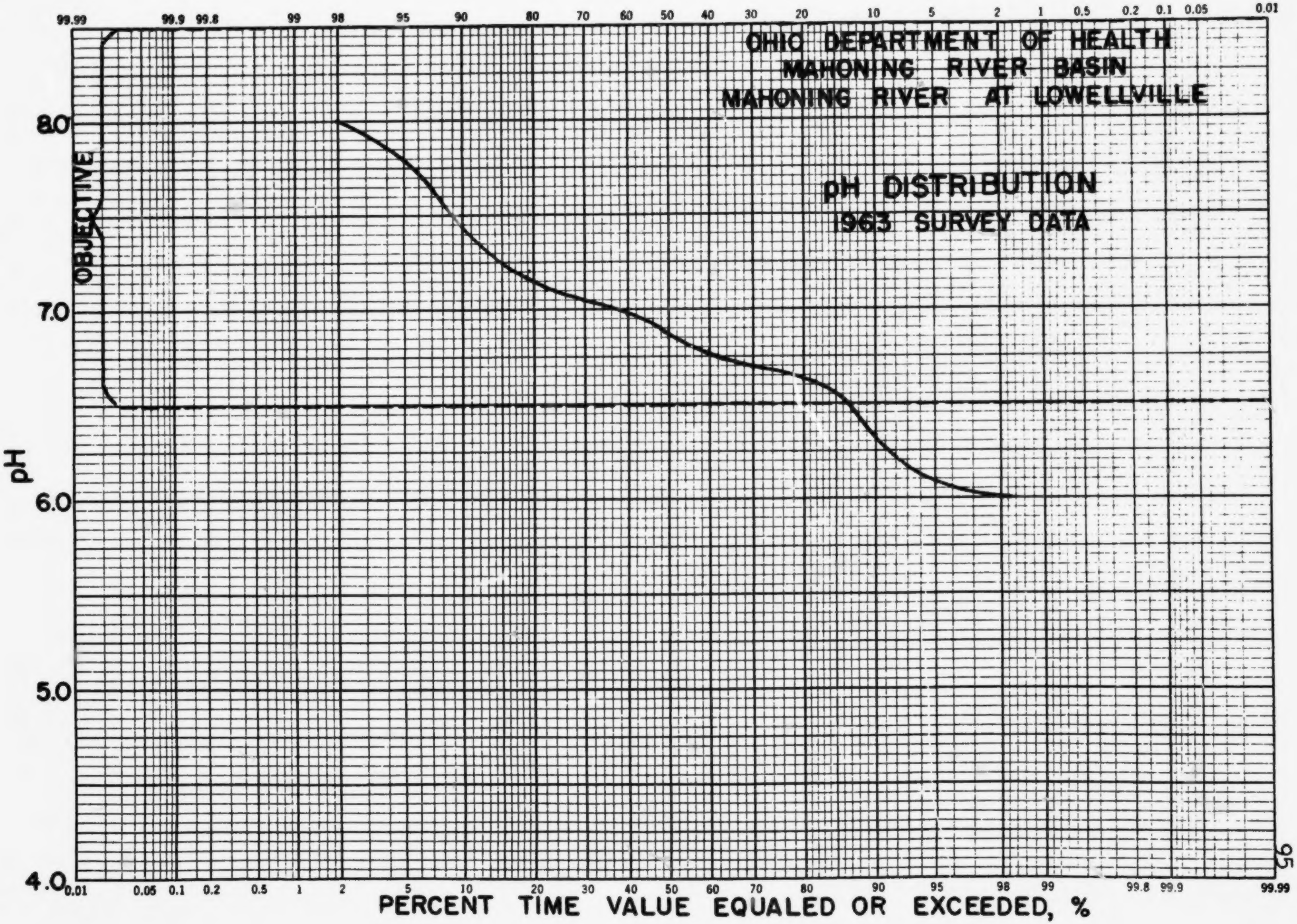

OHIO DEPARTMENT OF HEALTH
MAHONING RIVER BASIN
MAHONING RIVER AT LOWELLVILLE
PHENOL CONCENTRATION DISTRIBUTION
1964 SURVEY DATA
PHENOL, ppb
0
100
200
300
400
OBJECTIVE
PERCENT TIME VALUE EQUALED OR EXCEEDED, %
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99


OHIO DEPARTMENT OF HEALTH
MAHONING RIVER BASIN
MAHONING RIVER AT LOWELLVILLE
TEMPERATURE DISTRIBUTION
1964 SURVEY DATA
OBJECTIVE
TEMPERATURE, °F
30
40
50
60
70
80
90
100
110
PERCENT TIME VALUE EQUALED OR EXCEEDED, %
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99



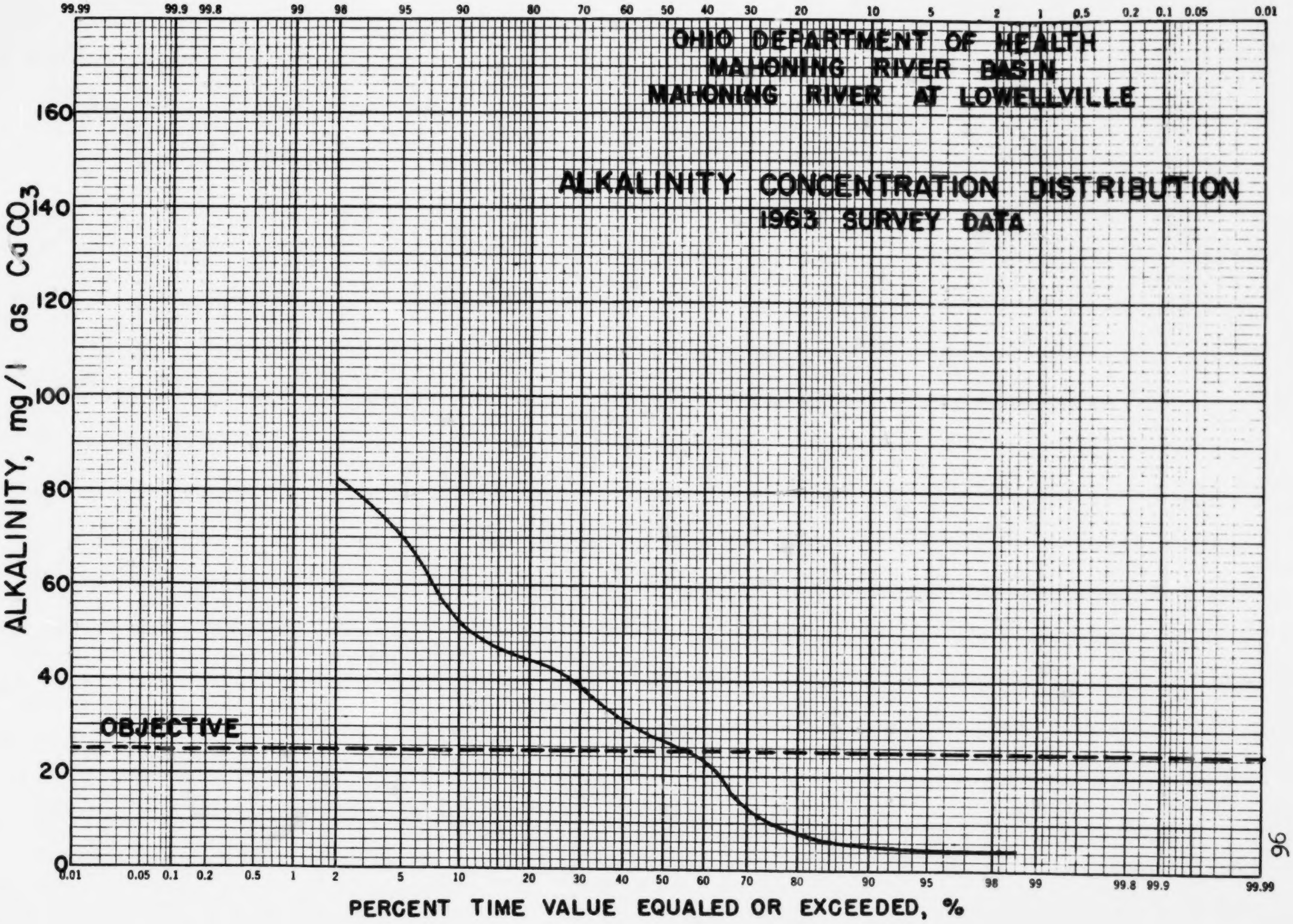
OHIO DEPARTMENT OF HEALTH
MAHONING RIVER BASIN
MAHONING RIVER AT LOWELLVILLE

DISSOLVED OXYGEN CONCENTRATION DISTRIBUTION
1963 SURVEY DATA

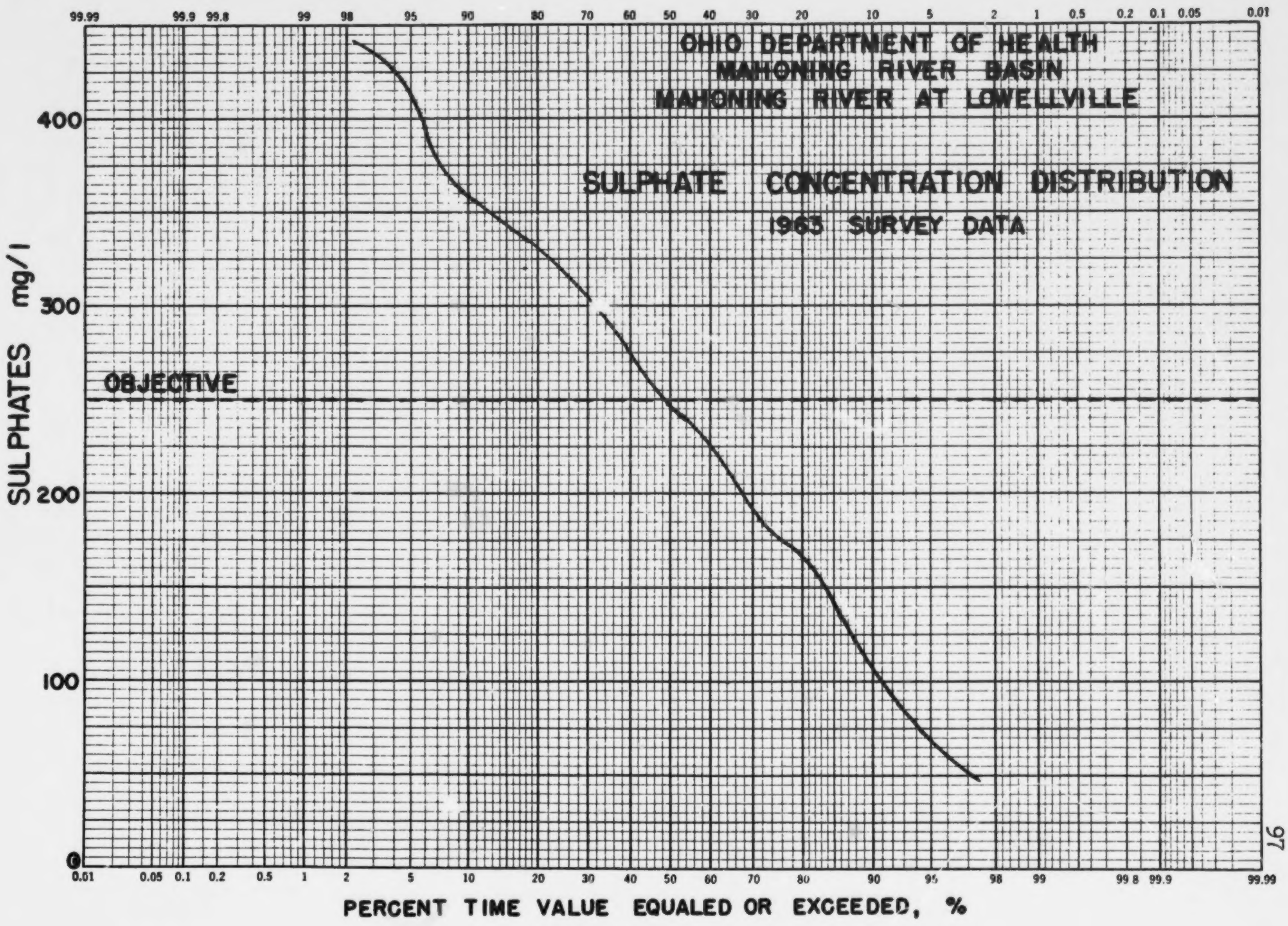


OHIO DEPARTMENT OF HEALTH
MAHONING RIVER BASIN
MAHONING RIVER AT LOWELLVILLE

pH DISTRIBUTION
1963 SURVEY DATA

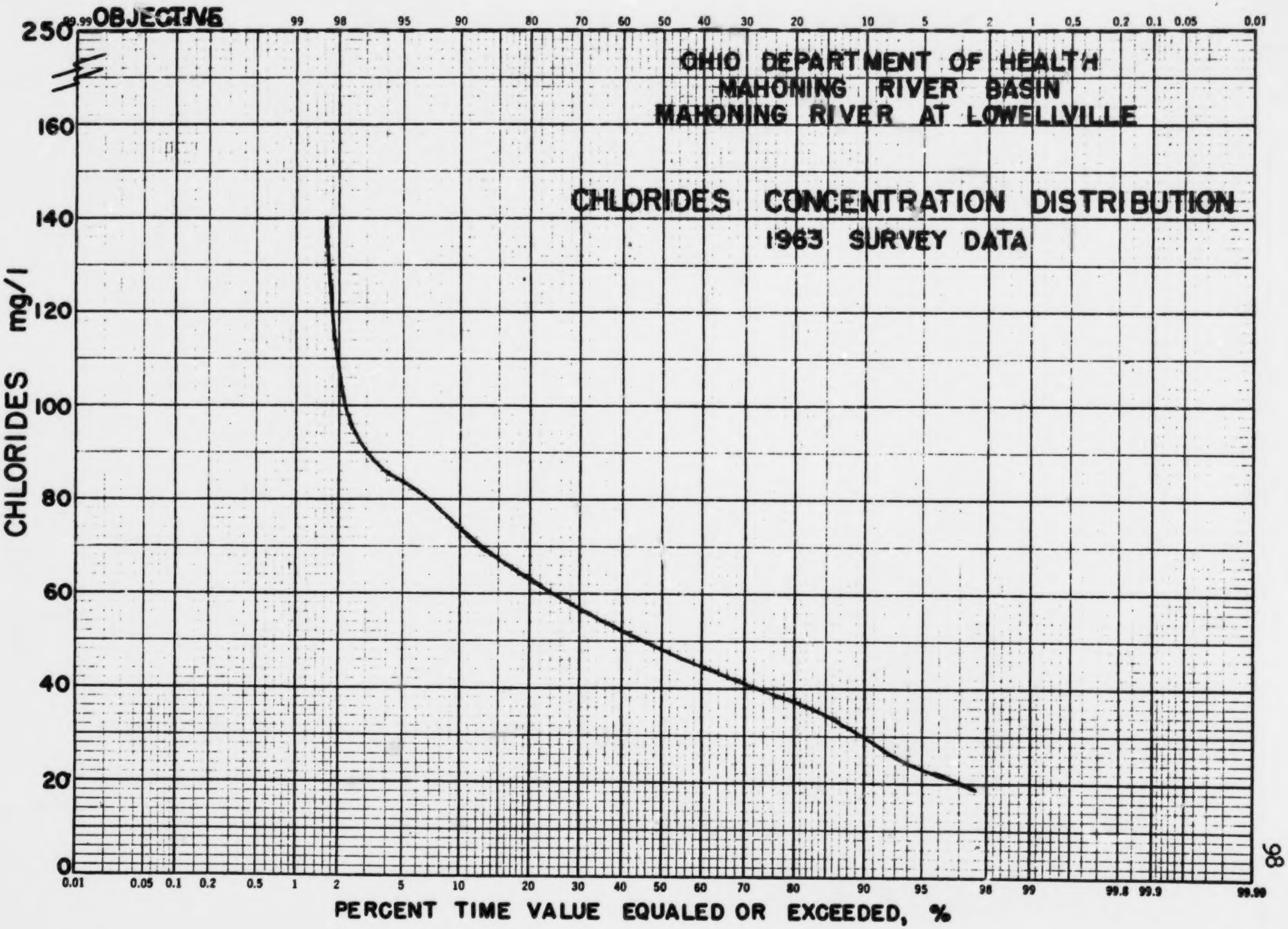

OHIO DEPARTMENT OF HEALTH
MAHONING RIVER BASIN
MAHONING RIVER AT LOWELLVILLE

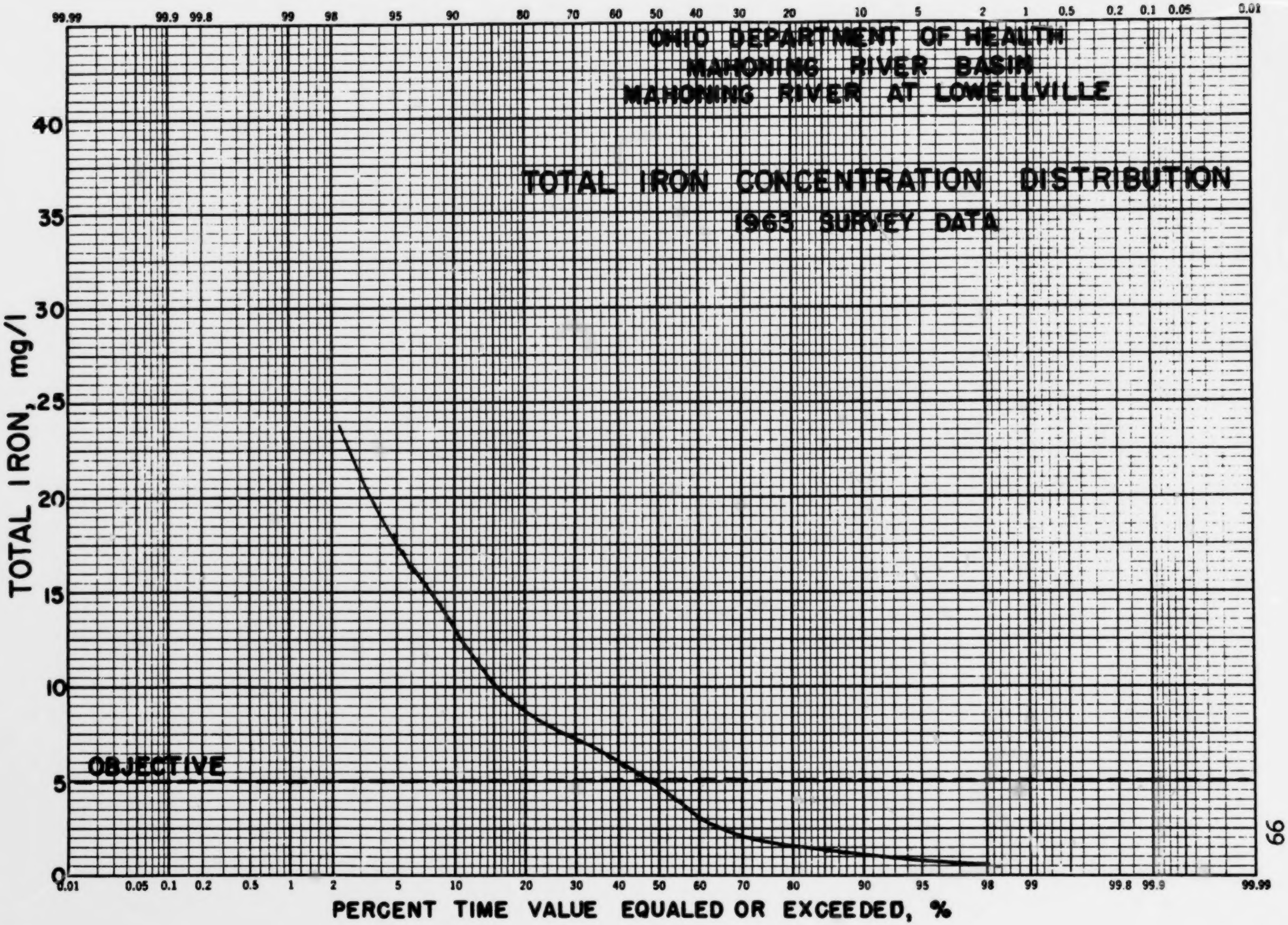
ALKALINITY CONCENTRATION DISTRIBUTION
1963 SURVEY DATA



OHIO DEPARTMENT OF HEALTH
MAHONING RIVER BASIN
MAHONING RIVER AT LOWELLVILLE

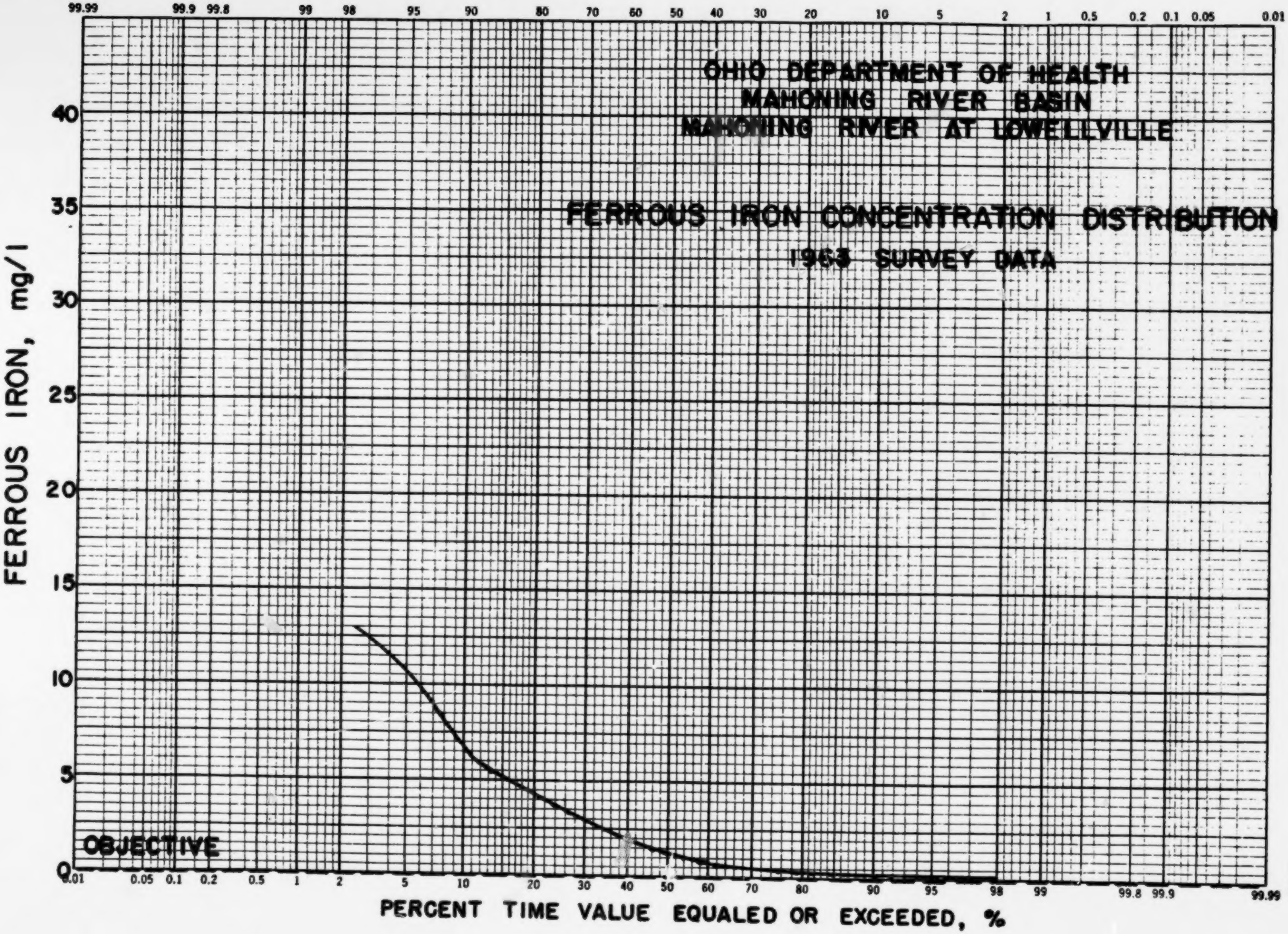
SULPHATE CONCENTRATION DISTRIBUTION
1963 SURVEY DATA


OHIO DEPARTMENT OF HEALTH
MAHONING RIVER BASIN
MAHONING RIVER AT LOWELLVILLE
CHLORIDES CONCENTRATION DISTRIBUTION
1963 SURVEY DATA
OBJECTIVE
250
160
140
120
100
80
60
40
20
0
CHLORIDES mg/l
0.01
0.05
0.1
0.2
0.5
1
2
5
10
20
30
40
50
60
70
80
90
95
98
99
99.8
99.9
99.99
PERCENT TIME VALUE EQUALED OR EXCEEDED, %



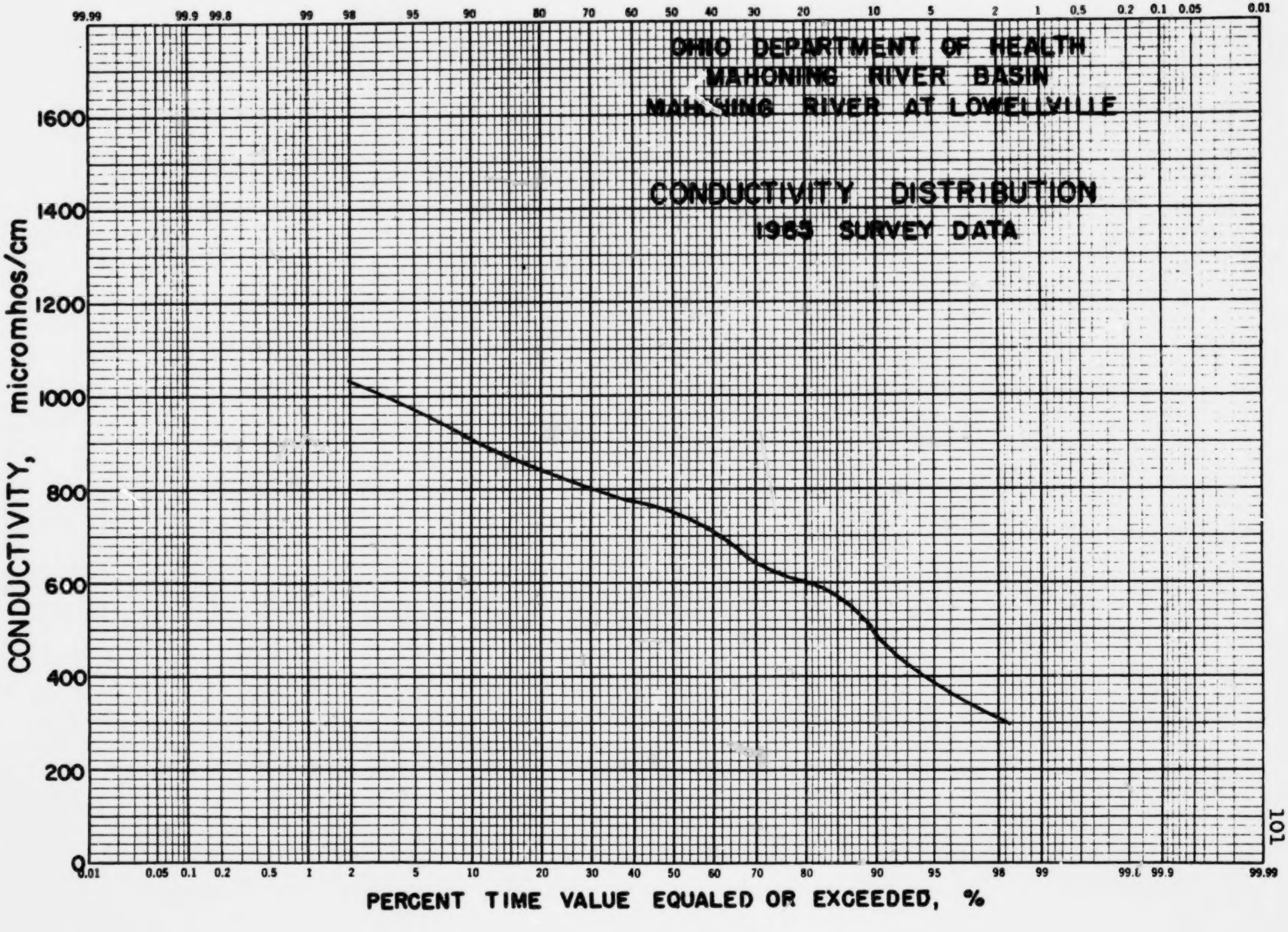
OHIO DEPARTMENT OF HEALTH
MAHONING RIVER BASIN
MAHONING RIVER AT LOWELLVILLE

TOTAL IRON CONCENTRATION DISTRIBUTION
1963 SURVEY DATA



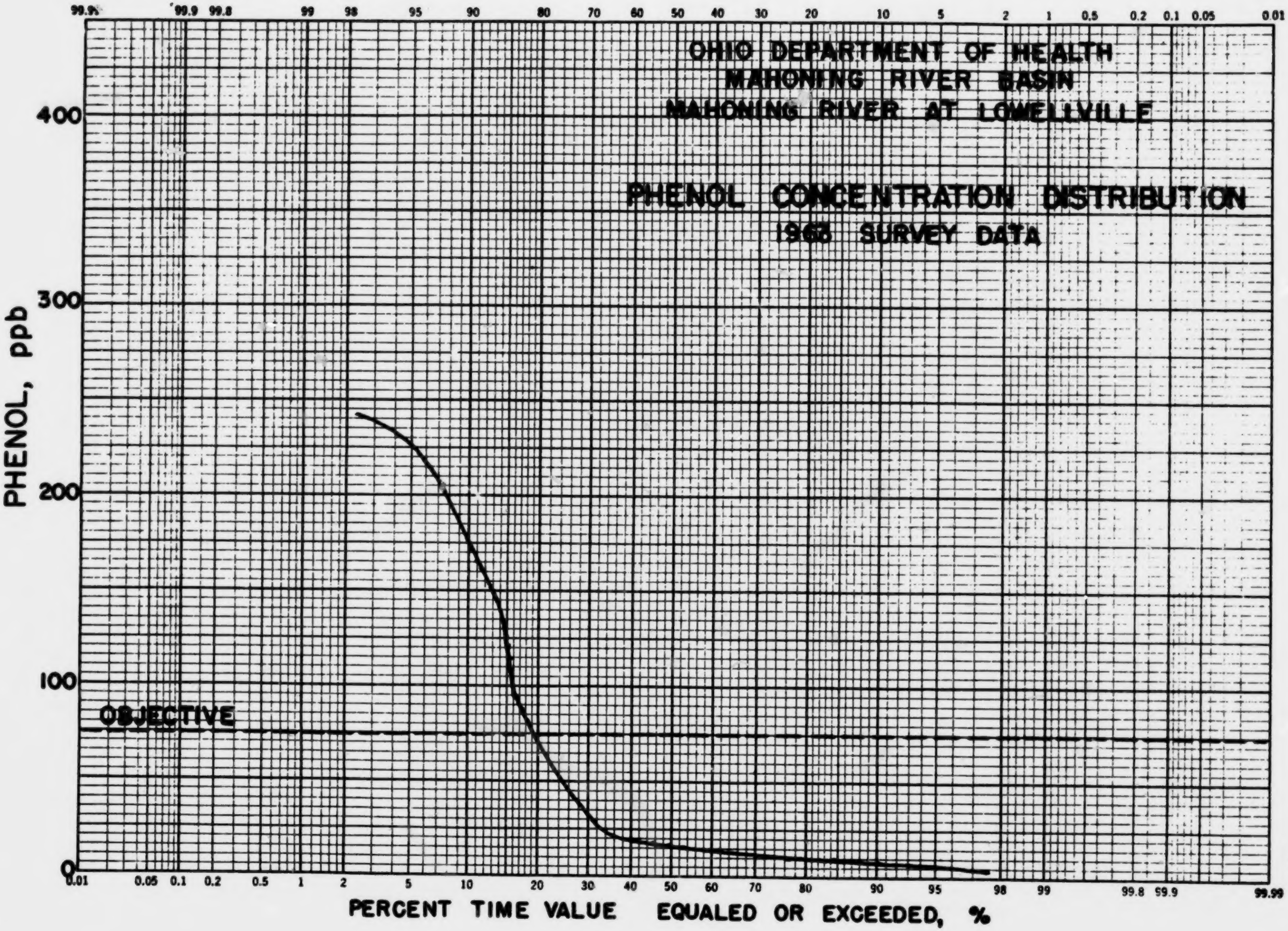
OHIO DEPARTMENT OF HEALTH
MAHONING RIVER BASIN
MAHONING RIVER AT LOWELLVILLE

FERROUS IRON CONCENTRATION DISTRIBUTION
1963 SURVEY DATA



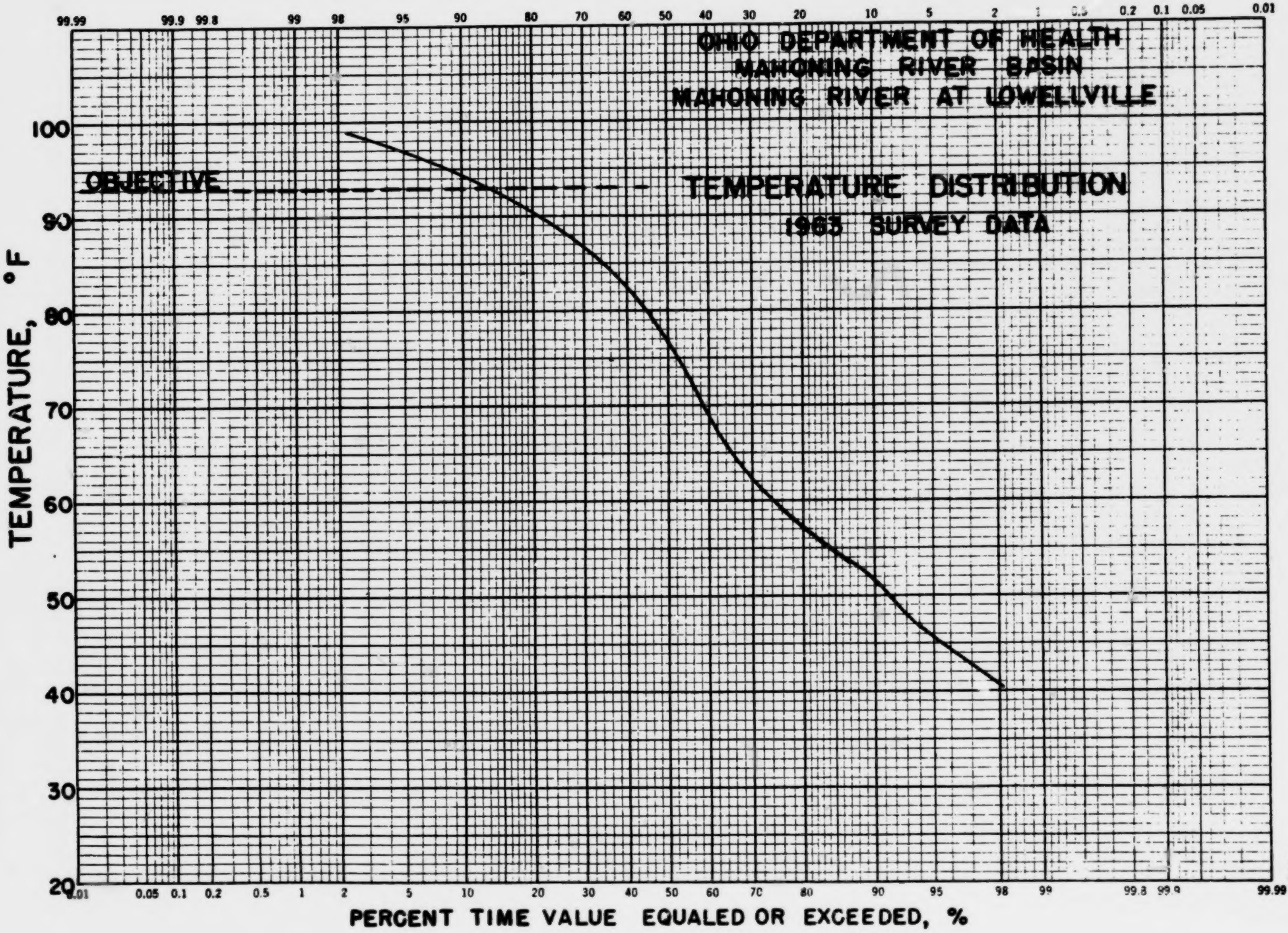
OHIO DEPARTMENT OF HEALTH
MAHONING RIVER BASIN
MAHONING RIVER AT LOWELLVILLE

CONDUCTIVITY DISTRIBUTION
1965 SURVEY DATA



OHIO DEPARTMENT OF HEALTH
MAHONING RIVER BASIN
MAHONING RIVER AT LOWELLVILLE

PHENOL CONCENTRATION DISTRIBUTION
1968 SURVEY DATA



OHIO DEPARTMENT OF HEALTH
MAHONING RIVER BASIN
MAHONING RIVER AT LOWELLVILLE

TEMPERATURE DISTRIBUTION
1965 SURVEY DATA

CHAIRMAN STEIN: Are there any comments or questions?

MR. POSTON: I have a question. I was going to ask Mr. Eagle a question relative to the industrial waste data. In development of our report, we felt that it was essential that we have industrial waste information and I wanted to ask him if it wasn't true that we had requested a matter of three times or four times information relative to the effluent data on the major industrial installations?

MR. EAGLE: Yes, sir, that's true, Mr. Poston. You not only requested, you more or less demanded.

MR. POSTON: I think that it's essential to do a good evaluation and I do appreciate receiving in this report summaries, although I haven't had time to digest all of the -- some 50 or 75 pages you have here. I do appreciate receiving this information and I am sure this is going to give us a better opportunity to evaluate some of these things.

Industry has instructed you not to give us this information?

MR. EAGLE: Well, Ohio's law prohibits us from giving out this type of information which is considered confidential without the express authority in writing of the owner of the plants and we had no such permission from these plants.

CHAIRMAN STEIN: Mr. Cleary?

MR. CLEARY: Mr. Chairman, may I make a comment? May I ask Mr. Poston is it necessary to have this detailed information on effluents from individual places in order to evaluate conditions of the stream? Isn't really what you are interested in what is in the stream, and where it is coming from is another matter, but the particular issue here is, is the stream polluted; to what degree? That's the way I understand the evaluation of the review board.

MR. POSTON: I think this is the ultimate, that is true, Mr. Cleary. But to evaluate a stream, for example, yesterday I was down looking at the river in a number of places and I noticed oil on the surface of the water and I looked for findings in the table here for where this oil comes from so that efforts can be made toward control of this; and this is impossible to do without knowing what is coming out of the individual effluents.

MR. CLEARY: Excuse me, but whose efforts are going to control it, Ohio or the Federal Government? What I am trying to establish here is the fact that observations were made at Beaver Falls with respect to the quality of the water that may endanger public health or welfare.

Now, the quality of the water of Beaver Falls is a pertinent matter, not what is coming out of the mill or municipality. Isn't that an appraisal?

MR. POSTON: As I said, I think it is the ultimate but to finally determine what needs to be done in the development of the schedule, there are three items to determine at this conference as directed in the law. First, the occurrence of pollution, that there is pollution and, secondly, what are causing the delays in the abatement proceedings and, lastly, a schedule for abatement. I think it is essential that you know where abatement procedures might be required.

CHAIRMAN STEIN: Are there any further comments or questions? Let me mention something here, and I am trying to do this in the sense of getting together. I appreciate the views that you have here on a conference. As you have expressed it, it is evidently shared by a considerable amount of the audience. You know, when you are playing in a visiting ball park, if they applaud the visiting team, you feel you are ahead. But I think, as far as I know, and I think you people do know we have been attempting to have summaries of dockets on all interstate treatments for many years. Mr. Poston in our regional office has been responsible for attempts to get that on the Mahoning. This isn't from the time the conference was called but considerably before that.

The reports that have come in to me, at least, I wouldn't say to me, into Washington, have been wholly incomplete. The information that we got was that this was impossible to obtain from state sources, although there were repeated requests of ORSANCO which may or may not have had the information and that the reports were therefore incomplete.

I don't think this would be giving too much away, but as much as two years ago, when Mr. Cleary was in the office, I showed him a copy of one of these incomplete reports where the regional and technical people had marked up and read all the places that were incomplete.

I think this is a fine report. Although you people don't like conferences. Someone back in Washington might think if the conference is the way to get a fine and complete report like this, perhaps the conference technique is the way to accomplish it.

Now I would suggest if a report as fine as this can come out in a conference, and if information were to be forthcoming, it should be forthcoming as a full exchange of information and this would facilitate the Federal Government, the state and all concerned in getting together.

I want to thank you, Mr. Eagle, that you recognize your responsibilities to the Federal Government, ORSANCO, and Pennsylvania. We recognize our responsibilities to the State of Ohio and ORSANCO and Pennsylvania but we also have a responsibility. I would suggest that, I think if the record -- I hope the record doesn't have to show that the way to get a fine report like this from the State of Ohio or the only way to get it --

MR. EAGLE: May I make a statement?

CHAIRMAN STEIN: Yes.

MR. EAGLE: This same report, except it is up to date at the present time, was presented to the Public Health Service in 1963 and this simply is an updating of this report. This information has been available and we never even got the courtesy of an acknowledgement of this report from the Public Health Service.

MR. POSTON: This is the report that was requested in '62.

MR. EAGLE: We gave it to you in March of 1963, this same report, except this is updated to the present date.

MR. POSTON: And with the exception of the narrative --

CHAIRMAN STEIN: Are there any other further questions or comments, Mr. Poston?

Does ORSANCO have any?

MR. POSTON: I reserve the right to comment on this further at a little later time when I have had a chance to look at the tabular material.

CHAIRMAN STEIN: Any of the conferees can make any appropriate comment they think, at any time, as long as the conference is going on. By the way, Mr. Eagle, I think we are very, very close together in the first part of your statement here.

MR. EAGLE: Thank you.

CHAIRMAN STEIN: On what it does, but I think, for the record, we should indicate in our abatement we do consider this an enforcement conference. This is the first part of enforcement action under the Act. I think other than that conclusion, I thoroughly -- at least I, speaking for myself -- thoroughly agree with your analysis, although there may be a semantic difference, I don't think there is a substantial difference in the way we analyze the Act at all.

MR. CLEARY: May I ask one question to clarify my thinking? The discussion developed on information of industrial plants. Now, do I understand, Mr. Poston, that what you are looking for in this report, that you didn't get it before, is that statement the statement you are making?

MR. POSTON: I don't think I have had a full opportunity to look it over and having just received this when Mr. Eagle started to give his talk here, but it appears to me that this is the type of information that we need, but I would reserve my comment until I have had a little

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more chance to look.

MR. CLEARY: Well, what I am getting at is that this information, according to the HEW report given to the conferees, said they couldn't get certain information. Now, I learned that virtually the same information, except being updated as of today, was provided in 1963. You said that, did you not, Mr. Eagle?

MR. EAGLE: Yes, he has a copy of it there, March 1963.

MR. CLEARY: So that what you got in 1963 did not suffice but what you have heard today, which I understand is virtually the same thing but brought up to date, does suffice?

MR. POSTON: We received in 1963 an earlier version of today's reports without the tabular information.

MR. EAGLE: Oh, no, you got all the tabular information with the exception of the graph and the narrative which are simply supplemented.

MR. CLEARY: In other words, Mr. Eagle, you are saying they got all the essential information?

MR. EAGLE: They got all the stream data and all the facilities data.

MR. CLEARY: I see. The record should have that clear.

CHAIRMAN STEIN: I think this would be clarified if the investigators for the Public Health Service had indicated that they have not gotten data or they made the requests and have not gotten it. I think they will have an opportunity to make a statement and I think this will be clarified. I hope it will be clarified as this progresses. But I think one of our major functions here is to frame an issue. And if there is a question or a statement that all the data was provided and someone says they didn't get it, I think before the conference is concluded I would hope the conferees would be able to make a judgment on that one way or another.

MR. POSTON: - I might clarify one point here, that there is certain effluent data that is characteristic of the individual industrial waste sources. We do not have that and I do not believe that it is in this report. The report we received in 1963 was approximately 12 pages and I see -- you can see the report that we received here today is some 50 to 75 pages.

CHAIRMAN STEIN: If there are no further comments, Dr. Arnold, I wonder if we could get up and stretch for 10 minutes and then reconvene because I know we can't hold you all morning.

(Recess had.)

CHAIRMAN STEIN: May we reconvene.

I understand that Mr. Poston and possibly others may have some comments or statements to make on the basis of the report we heard this morning from Dr. Arnold and Mr. Eagle, but there are some people here from Ohio who wish to make statements and leave because they have other commitments. So we are asking these conferees to defer these comments.

We will call on them, no one will be cut off, but I would like, at this point, to call on Dr. Arnold to call other people.

DR. ARNOLD: At this time, I would like to call the Honorable Mayor Schryver, Mayor of the City of Warren.

MAYOR SCHRYVER: Dr. Arnold, Mr. President, members of the conference and ladies and gentlemen: I, first of all, want to apologize to Mayor Flask for pre-empting his time but I would remind him now that we are upstream from him.

... Laughter ...

MAYOR SCHRYVER: My name is Raymond E. Schryver, Mayor of the City of Warren, Ohio. The location of the City of Warren in the heart of the Mahoning Valley steel district, its waterways, rail and highway facilities, have been contributing factors in making our city highly industrialized. The present population of 62,000 reflects an increase of more than 43 percent during the last two decades.

If Warren's suburban areas were included, the figure would exceed 80,000. It is an interesting fact that 65 percent of the homes in the city are owner occupied. Its trading area includes over 250,000 people and the city itself covers a physical area of 10.9 square miles.

Early in 1947 first consideration was given and action started to provide the Warren Metropolitan area with water pollution control. It is a significant fact that at this time all sanitary sewage was discharged directly into the Mahoning River. On March 28, 1947, an engineering firm was hired to prepare and report factual data pertaining to the existing sanitary sewer system of the City of Warren. Authorization was also given to explore the necessity for future alterations, additions and extensions thereto and to present recommendations relative to indicated expansion. The study was completed in 1949 and presented to the city. After the presentation of the report to the city, no further action was taken.

In 1952 the State Legislature passed the Water Pollution Control Act which regulated the discharge of polluted waters into any water course. Each and every municipality and other contributors to pollution of the water courses throughout the state fell under the jurisdiction of this law and had to obtain a permit to discharge into various water courses.

Warren came under this permit system and obtained its first permit (No. 391) in August of 1952. The city was granted permission to discharge sewage into Mosquito Creek and the Mahoning River until July 31, 1953.

On July 20, 1953 a contract was entered into with Havens & Emerson, consulting engineers, of Cleveland and New York, to prepare a report on sewage and waste treatment for the city. This report was submitted and accepted by the city and the preparation of plans, specifications and estimates was authorized.

The city's permit was extended twice to October 1954 in order to allow for the completion of the revised report and general plan with estimates for necessary interceptor sewers and sewage treatment plant and to secure the approval of this report by the State of Ohio. It also provided for the submission of a time schedule for completion of detailed plans of the proposed improvements and a construction schedule.

The plans submitted called for a treatment plant to be constructed on the east side of South Main Avenue, south of the Republic Steel property. The plant, to meet the Ohio Department of Health's standards for the first phase, was to be a primary with chemical precipitation plant, with vacuum filtration and incineration of raw sewage solids.

The interceptor sewer system generally follows the Mahoning River, crossing the river seven times in order to pick up existing sewers and to stay out of the path of the proposed Lake to River Canal.

In March 1959 the contract for the plant was awarded and construction started. The plant was completed in December 1960. The contract for the interceptor sewers was awarded in July 1961, which included the Mahoning River Interceptor and the Diversion Conduit. On June 8, 1962 the interceptors had arrived at such a stage that the treatment plant could be placed in partial operation. The last connection was made to the interceptor under this contract in October 1962.

An extension to the Mahoning Interceptor Contract D-1 was awarded in November 1962 and completed in May 1963.

Phase D-2, or Northwest Interceptor, is presently under contract and should be placed in operation tomorrow. Upon completion of this work, all of the sewers in the city which previously have emptied into the Mahoning River will be connected to the interceptor sewer system.

The contracts for this program will have been carried on at the following costs:

		Grant
Contract A-Sewage Treatment Plant	$3,327,395.62	$125,000
Contract B & C-Interceptor & Diversion Conduit	4,272,889.72	
Contract D-1	123,511.87	
		APW
Contract D-2-Northwest Interceptor (bid price)	975,431.40	$540,000
	$8,699,228.62	$665,000

These figures are construction costs only and do not include land, right of way, inspection or testing.

These interceptors as planned, designed and built are to provide county areas immediately adjacent to the city with pollution control. The interceptors will handle wastes from the Leavittsburg and Champion drainage areas.

The matter of the sewers presently discharging into Mosquito Creek from the city area is now being considered by the county, with the possibility of city participation.

In the years 1961, 1962 and 1963 a concentrated effort was made to eliminate storm water from the sanitary sewer system, mainly by eliminating down spouts and other surface water drains, illegally connected to the sanitary sewers. This entailed checking approximately 12,000 properties.

Since August of 1961 the Waste Water Treatment Department has undertaken a program to determine the degree of pollution in the Mahoning River and is also attempting to locate major sources of pollution. The treatment plant sampling includes 24-hour composites twice weekly. Three river stations located where the Mahoning comes into the city, and above and below the plant outfall, are sampled with the treatment plant samples. Any analysis and reports of the river sampling are relayed to the Ohio Department of Health. The Ohio State Board of Health was instrumental in this program with advice, training and help in numerous technical consultations.

The plant's first superintendent, Mr. William R. Hill, believed that education was essential to the successful operation of the plant, and therefore 14 of our present personnel are now certified with Class I licenses, and the present superintendent has a Class III license from the State Board of Health.

The State of Ohio Board of Health's short school in Columbus and at various high schools throughout the state has been one of the main training spots for these men.

We have no intention of letting the strides made in past years lull us into complacency and we will always strive to make our water pollution control as efficient as possible.

Thank you very much.

CHAIRMAN STEIN: Will you wait a moment and see if we have some comments?

MR. POSTON: I might ask one question, if he has his staff here. Mr. Mayor, does the City of Warren use the chlorination equipment that's indicated in that plant?

CHAIRMAN STEIN: Would you identify yourself for the record, sir?

MR. BARKER: I am Robert Barker.

I am the superintendent of the plant.

CHAIRMAN STEIN: And I suggest possibly for the clarification of the record if any other cities come up, they might do this. Because in the statement of Mr. Eagle, he said also this summer optimum treatment with disinfection will be provided for the first time. It would be helpful for clarification if the cities specifically indicate what their facilities and practices are in that area.

MR. BARKER: Yes. We have provided chlorination during the summer months.

CHAIRMAN STEIN: You have done it in the past?

MR. BARKER: Yes. We have provided chlorination during the summer months.

CHAIRMAN STEIN: You have done it in the past?

MR. BARKER: Yes. We will do it most definitely in the coming future.

MR. POSTON: The other thing I would like to bring out is that the Federal Government is interested in abatement of pollution in this Mahoning Valley, and Warren was one of the earlier projects to obtain a $250,000 grant for existence and construction for a three or four million dollar project; is that right?

MR. BARKER: Yes.

MR. POSTON: Are you satisfied with the retention time and the results that you obtained from your chlorination practice?

MR. BARKER: Yes, with the chemical treatments that we have tried thus far, we have gotten removals up to 75 percent and we feel that --

MR. POSTON: This is in operation during the summertime only?

MR. BARKER: The chlorination process, yes.

MR. POSTON: The rest of the chemical treatment applies throughout the year?

MR. BARKER: Well, we have not put it into full operation but we are ready and working on it and whenever we are told to do so. We know that we can go about the 60 percent removal requirements.

MR. POSTON: You are ready to go, in other words?

MR. BARKER: Yes.

MR. POSTON: Well, I am happy to see that. I think this is a stream they have talked about -- this stream about being the life blood of this industrial area and water is one of their resources. A resource that makes it possible for them to exist; and the cleaner water is the better way, I am sure.

CHAIRMAN STEIN: Let me ask you: 60 percent removal of what?

MR. BARKER: Of suspended solids.

CHAIRMAN STEIN: What do you think you can go up to?

MR. BARKER: Well, I would say that we can go well up to 80 percent removal with the proper usage of chemicals.

CHAIRMAN STEIN: This is again for clarification. They talk about treatment for disinfection. Is your chlorination done for disinfection plant control?

MR. BARKER: Well, we have pre-chlorination and post-chlorination.

CHAIRMAN STEIN: But the post-chlorination is done for disinfection. And you have done what kind of treatment, primary?

MR. BARKER: Primary with -- well, it's intermediate with the chemical treatment.

CHAIRMAN STEIN: How effective do you think that chlorination is on your effluent?

MR. BARKER: I feel it is definitely effective.

CHAIRMAN STEIN: You don't want to be more specific than that?

MR. BARKER: Well, in what way?

CHAIRMAN STEIN: In the kinds of reduction you get in your bacterial load.

MR. BARKER: Well, the only measure we have at the present time, of course, is over biochemical oxygen demand. We have no facilities at the present time for making --

CHAIRMAN STEIN: Do you care to say what -- getting that 60 percent reduction -- no, that's on suspended solids.

MR. BARKER: We have gone up as high as 50 and 55 percent.

CHAIRMAN STEIN: What is your retention time on the post-chlorination?

MR. BARKER: In the post-chlorination, about 20 to 30 minutes.

CHAIRMAN STEIN: Okay, thank you.

I don't have anything further. Are there any further comments or questions?

Thank you very much, sir, for a very enlightening presentation.

DR. ARNOLD: It is my pleasure to call on the City of Youngstown.

CHAIRMAN STEIN: Without pre-empting the Mayor again, sir, may I ask one question to help these people get served?

MAYOR FLASK: I will be through in 20 minutes.

CHAIRMAN STEIN: Off the record.

(Discussion off the record.)

MAYOR FLASK: First of all, as being the host of this City, may I welcome all of you here, especially the out of town guests. I can assure you that we will be most hospitable and most cooperative in our dealings with you. I would also do a little ad-libbing here. On February 9th this year, just a few days ago, I had the privilege of being in Washington, D.C., and received an honorable mention award as one of the cleanest cities between 100,000 and 200,000 population in America, and I think that is quite a feat in our town.

... Applause ...

MAYOR FLASK: And with all due respect to my colleague and good friend, Mayor Schryver, I want to say that Youngstown happens to be downstream and you have stream problems, but maybe our problem is because we are downstream from the City of Warren.

... Laughter ...

MAYOR FLASK: My name is Anthony B. Flask, Mayor of the City of Youngstown. I have been a member of City Council and President of Council and have served continuously with the City since February of 1947 (18 consecutive years).

Therefore, stream pollution is not a new subject to me. What is new to me is the appearance of the U.S. Department of Health, Education, and Welfare officials in Youngstown.

Where have these officials been for the past 18 years? Why haven't they visited our City during this time, when we had great need of advice and counsel in stream pollution?

It seems to me that they are quite late for such a report as I have received on February 11, 1965. We wish to inform all people present here today that the people of Mahoning County and City of Youngstown have and are making great sacrifices paying for the entire waste water treatment plant, and the entire sewer system. Our cost will amount to more than $12,000,000 plus interest charges. There are no Federal or state funds involved in the entire system.

... Applause ...

In addition to this cost of the complete sewage system, may I remind you that the Mahoning Valley Sanitary District is actually the City of Youngstown and the City of Niles. Youngstown has paid for over 83 percent of the cost of this plant and is paying for all water that we use from the Berlin Reservoir, in addition to the construction of the pipeline that connects Berlin with the Meander Reservoir, over five million dollars.

We wish also to call to everyone's attention that the City of Youngstown owns, maintains and operates Lake Milton. With all of this, we also contribute a great share of the cost for the construction of the West Branch Reservoir, by a bond issue that was passed by the people of Mahoning County.

These are the facilities that we provide for recreational purposes such as referred to in the report, namely, boating, fishing,swimming and similar activities.

The Mahoning River, on the other hand, is an important economic factor for the entire Mahoning Valley. All of us are dependent upon its contribution to industry. Its importance as a source of water supply for industrial use has placed us in a strategic position and role as regards national need for water. It can provide critical service in times of national crisis.

Additional uses for the Mahoning River are secondary and all political subdivisions should find other sources of water supply for these uses. They, like Youngstown, should build reservoirs for drinking water, fishing, boating or any other recreational activities.

Youngstown and certain other municipalities are fulfilling their responsibility, and we believe if the U.S. Department of Health, Education, and Welfare is concerned about areas that cannot fulfill their responsibilities in this regard, the U.S. Department of Health, Education, and Welfare should aid them at someone else's expense and not at ours.

Congressman Michael J. Kirwan, a member of Congress for the past 30 years, is probably the leader in our Nation in protecting natural resources such as water. He has always advocated the preservation of our streams and forests. We are in complete accord with his efforts to keep our Nation concerned about this matter.

Our hopes have been inspired by his leadership toward the building of the Lake Erie to Ohio River Canal. The U.S. Army Corps of Engineers will be issuing a report on this proposal very soon.

This canal will make our people become more dependent upon the Mahoning River because the establishment of industries along the route of this canal will provide additional jobs and economic sustenance to our area.

It will, in fact, provide economic stimulus to this entire portion of the Nation.

As a result, the Mahoning River will be a river dedicated to and serving National interests as well as local interests, a river important to industry, commerce and business.

Congressman Kirwan has been the canal's chief proponent and the people of the entire Mahoning-Trumbull Valley have rallied to his support and will continue this support when the Corps of Engineers submits its report to Congress.

In summary, therefore, I say that we in this area have undertaken every measure available to us to preserve and protect our water and other natural resources.

This, we hope, will be done as well by others in their turn. Thank you.

I have now another prepared statement which is more engineering in aspect and technologically somewhat in an engineer's viewpoint. If I may ask the Chairman and his conferees, I believe that it would be best for the gentleman who prepared it, Mr. Richley, who is Director of Public Works of the City of Youngstown, to continue on before questions are asked, if I may, sir.

CHAIRMAN STEIN: Certainly.

MAYOR FLASK: And I just want to add one more thing. Upon completion of our treatment plant, which should be done within the next 90 days or so, we will have an annual budget of over one-half million dollars for operating and maintaining that plant, so that's an additional half million dollars each year the people of Youngstown and, naturally, some parts of Mahoning County will have to contribute to continue on with this project of ours, and we are very proud of our plans.

So may I, at this time, present to you Mr. J. P. Richley, Commissioner of the Waterworks of the City of Youngstown.

MR. RICHLEY: Mr. Chairman, ladies and gentlemen: The single most important factor in the availability of natural resources in the Mahoning Valley as far as the people of the valley have been concerned for years is, of course, the river. Along its miles of length are the Cities of Beloit, Sebring, Alliance, Newton Falls, Leavittsburg, Warren, Niles, McDonald, Girard, Youngstown, Struthers, Campbell, Lowellville in Ohio, and many others in Pennsylvania. This total population area served by the river is, therefore, well in excess of one-half million persons.

In addition, the Mahoning River supports 25 water-using industries with nearly 105,000 employees. These employees represent in one form or another every family unit in the valley. Obviously, the quantity, quality, temperature and other characteristics of the river are of the utmost importance to all. For many years, the Mahoning River has served admirably -- but not completely -- its highest and best economic use -- that of providing industry along its banks with their primary water needs and that of providing a place of discharge for the liquid wastes of the valley.

Without the availability of this natural resource, the Mahoning Valley could not have reached the economic stature which it presently enjoys.

II. Need for Anti-Pollution Controls.

The Department of Health of the State of Ohio and the people of the valley, have long since recognized the need for the preservation of this resource and the importance of some type of anti-pollution control law. All industries and municipalities discharging wastes into the river have embarked on programs designed to control the qualities of domestic and industrial effluents discharged into the river. These programs were and are being carried out under the strict control and surveillance of the Ohio Water Pollution Control Board with required approvals on all phases of planning and design. Minimum treatment requirements prescribed by the Board are being used as the basis of design, with degrees of treatment controlled by the nature, size and the location of the receiving stream, lake, or river, and dependent on temperature and flow of the receiving body.

Again, the degree of treatment to be provided for by each municipality is a function of the nature, purpose, and usage of the receiving body. These criteria have been established for the protection of the general health, safety and welfare of the public and are now in most cases being satisfied. It is not the purpose of these criteria to return effluents to the river in such a condition that they are suitable as domestic water supply, and/or recreational areas. The question is, therefore, not one of a complete disregard for anti-pollution measures but one of the nature and degree of treatment facilities required.

III. Domestic Treatment Facilities Provided.

As a result of these regulations, domestic sewage treatment facilities are now in operation or under construction in nearly 20 cities and villages from Warren to the Ohio State line. In all cases where effluents are discharged directly into the Mahoning River, provisions have been or are being provided for primary treatment. Where smaller plants discharge into tributaries of the Mahoning River, secondary treatment is accomplished. Cities with primary plants include Warren, Niles, Girard, McDonald, Youngstown, Campbell, Struthers, and Lowellville, among others. Specifically the City of Youngstown is nearing operation of a primary treatment facility which serves the needs of nearly 190,000 persons or approximately 40 percent of the total population of this area. This facility constructed at a cost of $7,000,000 and in accordance with the design criteria provided by the state, offers sedimentation, sludge incineration and post-chlorination as part of the treatment process. It is designed to remove 90 percent of all suspended solids and provide a reduction in biochemical oxygen demand of 65 percent. In addition, during periods of low river flow and high water temperatures, chemical dosing and chlorination is provided. In addition to this treatment facility, pumping, sewer separation, overflow and diversion facilities have been provided at a cost of some $5,000,000. As a result, no dry weather flow will be discharged into any stream, lake or creek in the City of Youngstown. All dry weather flow is being diverted to the treatment facility along with the initial flush of wet weather flow. The people of Youngstown have, therefore, made an investment of some $12,000,000 in separation and treatment facilities with the full cooperation of the Ohio Water Pollution Control Board without a single dollar of state or Federal funds.

It is to my knowledge and information that industry along the Mahoning, in complete cooperation with the Department of Health and ORSANCO, are similarly expending large sums to increase the quality of their industrial wastes as well as to cause a separation in their domestic and industrial effluents. Much work has been done by industry in the control of mill scale, gases, and coal tars, oil separations, phenols and other harmful discharges.

IV. Domestic and Industrial Water Supplies.

The City of Youngstown, as early as 1917, recognized the need for a domestic water supply other than the Mahoning

River, when it constructed Lake Milton with a storage capacity of 9.5 billion gallons. In 1926 Youngstown and Niles joined in the construction of the Meander Reservoir which covers some 2,000 acres with a storage capacity of 10.5 billion gallons. This was some 35 years before any Federal and 26 years before any state anti-pollution control measures were enacted. This domestic supply has since been enhanced by the construction of pipelines from the Berlin Reservoir to further supply Meander. The City of Warren is served by Mosquito Reservoir, an independent water supply, and such cities as Campbell, Struthers, and Lowellville are served from private lakes owned by the Ohio Water Service Company. The only major remaining users of the Mahoning, as a domestic water source, are the communities of Beloit and Sebring, and each of these are located on the headwaters of the river.

The importance of the Mahoning River as an economic industrial base has been recognized for many years by the Corps of Engineers, and the Congress, as evidenced by the construction of Mosquito, Berlin, and West Branch Reservoirs which not only provide low flow, temperature, and flood regulation on the Mahoning, but serve the domestic and recreational needs of large areas. It is evident, therefore, that the need for the waters of the Mahoning are primarily for industrial uses with domestic needs being supplied elsewhere.

V. Recreational and Wildlife Uses.

It is inconceivable to think of the Mahoning in terms of recreation such as fishing, boating, and swimming uses. This concept has long been discarded as evidenced by the many water facilities constructed over the years in the valley. Available recreational facilities among others include Berlin, Mosquito, McKelvey, Evans, and Pine Lakes which are adequate swimming, boating, and fishing facilities. In addition, Youngstown has provided 10 parks, 39 playgrounds, and six public swimming pools valued at nearly $4,000,000. These facilities are supplemented by those of other cities in the area and, as a result, the valley has never suffered a hardship because of the unavailability of the Mahoning for these purposes.

VI. Summary and Conclusions.

The City of Youngstown readily joins the Department of Health of the State of Ohio and the Department of Health, Education, and Welfare in their interests in cleaning up the river. The only area of possible disagreement might be in the degree of treatment required. Health, Education, and Welfare has suggested a reduction of 85 percent in biochemical oxygen demand while 65 percent has generally been provided for by most communities along the river. The Department of Health, Education, and Welfare suggests the use of the Mahoning for recreational purposes where it is felt that many other facilities are available in the area. The Department of Health, Education, and Welfare suggests secondary treatment of domestic wastes where it is felt that the criteria of the State of Ohio are adequate. If secondary treatment was to be provided along the valley, an expenditure of 15 to 20 million dollars would be required.

It is felt that much remains to be done in the field of anti-pollution and all machinery is now geared toward that end. Further improvements could be made in the aesthetics of the river with the highest and best use of the river as the final criteria and with the knowledge that domestic water supplies and recreational facilities such as swimming, fishing, and boating are being provided for elsewhere and with the hope that the highest and best use of the Mahoning might be in the field of water transportation with the construction of the Lake Erie - Ohio River Canal.

Thank you.

CHAIRMAN STEIN: Thank you, Mr. Richley.

We didn't hear from our report yet. When did the Department, HEW, recommend secondary treatment?

MR. RICHLEY: I gather from the concluded remarks of the report that it is approaching 85 per cent reduction of Biochemical Oxygen Demand. I believe that's in the last paragraph of your report of your conclusion.

CHAIRMAN STEIN: In other words, what you are doing is discussing the report and you are just doing this for clarification which hasn't come in yet; hasn't been discussed here yet.

MR. RICHLEY: Let me not call it the report, let me call it some of the advanced information that I have received.

CHAIRMAN STEIN: You understand we are just doing this for the record. Because if anyone reads the record and doesn't have a prior preference, you can get awfully confused. Any comments?

MR CLEARY: Mr. Richley, I think earlier in your testimony you said something about Youngstown providing primary treatment only and then later on you said you have a plant that provides 65 percent. I think that would be intermediate treatment, or did I misunderstand you?

MR. RICHLEY: Yes, we have a primary plant but we have pre-chlorination for intermediate treatment and post-chlorination.

MR. CLEARY: It is required by the Ohio program. You have to provide 65 percent disinfection.

MR. RICHLEY: This is correct. These are provided during time of low river flow, especially during the summer months.

MR. CLEARY: And you have the facilities

to provide that?

MR. RICHLEY: Yes, sir.

MR. CLEARY: I just wanted to make sure.

MR. POSTON: Does this mean, then, that you, like Mayor Schryver of Warren, they are awaiting the word to go ahead and provide additional treatment, does this mean that you would be willing to provide this additional treatment?

MR. RICHLEY: Provide which additional treatment, sir?

MR. POSTON: When requested.

MR. RICHLEY: I don't understand your question exactly. We feel, as we have felt for some time, that the requirements of the Department of -- or the Health Department of the State of Ohio are adequate. We feel that we are providing 65 percent reduction B.O.D. removal of 90 percent of suspended solids and also making provisions for intermedial treatment by pre- and post-chlorination during periods of low river flow, higher temperatures, especially during summer months.

Are you talking of further treatments such as filtration?

MR. POSTON: I was wondering if you would get this 65 percent removal, 90 percent removal.

MR. RICHLEY: I think within 90 days we will know if we will get it or not, and we certainly hope we will get it because our plan is designed exactly for that purpose.

MR. POSTON: Thank you.

CHAIRMAN STEIN: Are there any other comments or questions? If not, thank you very much, sir, unless you have any further remarks you want to make.

I might say one thing before you go and this is-- I am ready to leave this on the record but if you want you can have it off -- I would suggest, sir, that with your Erie-Mahoning Canal that is being proposed, that as you well know, we, in our Department, comment to the Corps of Engineers and these comments are sent to the Congress on this. I would suggest that it is always best in a project of this kind if the Federal agencies, states and everyone is together on it -- at least in all areas, but particularly the measure of treatment that should be required so that there will be no problem there.

I know of no project to my knowledge which has gone forward in recent years where there wasn't pretty much agreement among all parties concerned. That is, state, Federal, interstate, and local on the degree of treatment required before the project went forward. I think this is an area that we may look forward to if this is a very worthwhile project.

Obviously, I can't say very much more one way or another on this.

MAYOR FLASK: Mr. Stein, the only thing I can say is that we have fulfilled our agreement with the State Pollution Board and they have already approved our plan sometime ago, some years ago, to be exact, and we have had a most difficult time in getting our people to pay for this and they are paying. I think you ought to take a visit and see the plant first.

CHAIRMAN STEIN: Sir, I am not talking about the plant or the river. This is what I want to make clear on this. You mentioned your Erie-Mahoning Canal. The water in that canal or the water quality in that canal has to be protected. This is a Federal law, and this is a Federal requirement. While this is a Corps of Engineers project, our Department makes a recommendation as to the facilities that are going to protect that water quality. I am just suggesting, sir, that it would be wise to get Federal, state, interstate, and local interests in line on the type of water quality control that is going to protect the waters in that canal, and this is aside from the river.

MAYOR FLASK: What do we care about the river as long as it brings the barges down, the iron and coal into the steel mills?

CHAIRMAN STEIN: Sir, I recognize what you want, but I --

MAYOR FLASK: And what you are going to get.

CHAIRMAN STEIN: Bless you. I Certainly am not going to stand in your way. We have a statutory obligation under our law to examine the project and see that the water quality is protected.

MAYOR FLASK: You see what puzzles me, in all these years I have been in city government, and 18 is a long time I presume, consecutively, you people never came into the picture; never heard about you, honestly, and we have tried to go along. Now seriously, I am not trying to be facetious about this either, but we have attempted in all instances -- well, we were compelled to, should I say, go along with the State Pollution Board, and each year we had to go forward and get a certificate and show our intent on this elimination of the pollution of the Mahoning River. And, oftentimes, we had the most difficult time with the state authorities in getting the certificate to be able to discharge our sewage into the river. And now we have gotten to a point where I thought we could ignore the State Pollution Board, to be exact. I mean, we have accomplished what they have been asking for in all these years, and all of a sudden now someone else comes into the picture.

I hope they don't expect us to spend any more money because we don't nave any. If somebody wants better treatment, so somebody can drink water down in Pennsylvania, that's all right with us as long as they bring us the cash and the money and tell us how to do this and that. And I wouldn't dare, as a politician or a mayor or as a private citizen, ask the people of Youngstown and those parts of Mahoning County that we are taking the sewage from for additional funds and for additional purposes for better and cleaner water. As long as the water is clean and cool enough for a canal and for industry, business and commerce, I think that's the big motive behind the Mahoning River. I think that's the only thing we hope to look at, because no plants or no industries are going to build in Youngstown or in any part of the Mahoning and Trumbull Valley unless they have a water supply for industry.

I have been here 59 years in Youngstown, and in all my years -- yes, 45 years ago I swam in the Mahoning River, up in the Girard area. Yes, I crawled over many a boxcar and over many a track to get to the old swimming pool, swimming pond I called it. You didn't have bathing suits or anything of that sort in those days, but, at that time, it might have been all right but I don't know whether you want your children or grandchildren to be swimming in the Mahoning.

I don't care what kind of treatment they have. They have got the rapids, they have got the stones, they have all the dams, they have all the obstacles necessary for industry, and when you see the barges come down there and the smoke bellowing out of these stacks and thriving business for economy s sake, and our people, I think, will accomplish a great deal for the Mahoning-Trumbull Valley. That is the important part and we have a most pleasant site in this valley of ours today because it is thriving. Business is here and people are working much more than ever before, and I think that's the primary purpose.

If you make people happy, you have got good citizens, you have got good Americans, and when they aren't working, they aren't happy, and,oftentimes, we may be led astray by other groups that we are not interested in and, so help me, I believe all of us are here for that one aim in life, good Americans, happy times, and thank you very much.

CHAIRMAN STEIN: Thank you very much, ma'am.

... Laughter ...

DR. ARNOLD: Mr. Bruce Graybill, the oil superintendent of the water and sewage treatment of Alliance, will speak for the Honorable Mayor of the City of Alliance.

MR. GRAYBILL: Ladies and gentlemen, conferees, I think my name has already been mentioned so there is no sense in going into this. The City of Alliance was truly one of the pioneers in sewage treatment, this City being the second in Ohio and one of the earliest in the Nation to construct a treatment plant. A chemical precipitation plant with sludge presses was constructed in 1895 and operated until 1912 when a new plant consisting of plain sedimentation tanks, contact beds and fine grain filters was placed into operation.

CHAIRMAN STEIN: I hate to interrupt you, but I wonder if you could go over to the map and point it out on the map.

MR. GRAYBILL: Over there on the curtain? We are up here (indicating).

CHAIRMAN STEIN: Thank you very much, sir.

MR. GRAYBILL: In 1929 a new treatment plant was constructed on a 450-acre tract of land purchased by the City, some one and one-half miles north of the City limits. This plant was of the Imhoff tank-trickling filter type.

In 1942 and again in 1952 construction was undertaken to further improve and modernize this plant to meet all requirements for adequate pollution control. In 1960 the plant was enlarged by the installation of a new diversion and comminuter chamber, 24" to 42" piping, airlift units pre-aeration and grit removal tanks, trickling filter recirculation, a secondary digester and meters, pumps and other appurtenances in order to provide the best possible treatment of domestic and industrial waste for both the City and surrounding areas. This plant is designed to provide a maximum of 94 percent removal of suspended solids and Biochemical Oxygen Demand. Capacity of the plant is 8 M.G.D. and is presently operating at 45 percent of that capacity.

Complete analytical results are submitted to the State of Ohio Health Department each month covering plant operation and receiving stream to assure that the plant's operation meets the requirements set up by the State Health Department. Tests are carried out in a complete laboratory at the plant and standard methods are followed by a qualified man. The City is operating under a permit issued by the Ohio Water Pollution Control Board which indicates that satisfactory facilities and operation of same meet the requirements of the State of Ohio.

The effluent from the Alliance plant contributes to the Berlin Dam Reservoir which is a recreation area used by the public for fishing, boating, water skiing and camping. Downstream tests taken weekly assure that the plant is operating correctly in that the effluent always contains better than 4 p.p.m. dissolved oxygen and increases 1000 yards downstream to an average of 9.8 p.p.m.

An over-all comprehensive plan for a sewer system has been prepared by a firm of consulting engineers encompassing adjacent areas in three counties. These plans are to be implemented in the most developed suburban areas beginning this year.

Industries in this area have cooperated both with the City and the State in that they have treatment facilities within the plants for pollution abatement of the effluents to the City's water pollution plant and the receiving streams. These facilities have been recommended by the Water Pollution Control Board of the State of Ohio and operation is checked by staff members of that Board. Permits are issued to the industries by the State, issuance subject to the effluents meeting requirements set up by the Water Pollution Control Board. These requirements are dependent upon type of plant, waste expected, and removal of material that would be harmful to receiving stream life. The U.S. Public Health Service made a survey of an industry located in Alliance and after studying the results issued a statement to the effect that "for reuse of the water within the plant the treatment of the waste by coagulation with lime, alum and poly-electrolyte and sedimentation provide excellent removal of suspended solids and provide an effluent suitable for reuse at least 25 times." The U.S. Public Health Service also makes this statement.

"This Company operates a very unique and efficient waste treatment system. They contribute substantially to the control of water pollution and provide an excellent example of water conservation."

The City of Alliance had used the Mahoning River as its water supply. During dry years it was necessary to pump the wells as the river could not contribute enough water to satisfy the demand. As the supply from the wells was limited, a study was made and it was decided that Deer Creek Reservoir should be built for a more reliable source of supply and also to assure that water would be available for expansion domestically and industrially. This has proved to be sound logic as the recent dry years have shown.

CHAIRMAN STEIN: Thank you, sir. Are there any comments or questions? If not, thank you very much.

MR. POSTON: Mr. Graybill, you indicate you have 94 percent removal of suspended solids?

MR. GARYBILL: No, I said it was designed for 94 percent.

MR. POSTON: And you have 45 percent?

MR. GRAYBILL: No, sir, I just had this year's reports. We will have 80 percent B.O.D. removal and 84.5 percent suspended solids.

MR. POSTON: And this trickling filter

type plant?

MR. GRAYBILL: Yes, sir.

MR. POSTON: This effluent that you have from this plant does not go to the Mahoning River?

MR. GRAYBILL: Well, it goes into the Mahoning River to Berlin Reservoir.

MR. POSTON: I see. Then the effluent from this plant does eventually go down the Mahoning River?

MR. GRAYBILL: Yes.

MR. POSTON: I think that's all I wanted to ask.

CHAIRMAN STEIN: Thank you.

DR. ARNOLD: We will proceed now with Mr. Kenneth Lloyd, Executive Secretary of the Mahoning Valley Industrial Council.

MR. LLOYD: Mr. Chairman, honorable conferees, and ladies and gentlemen: My name is Kenneth M. Lloyd. I am Executive Secretary of the Mahoning Valley Industrial Council, 802 Union National Bank Building, Youngstown, Ohio. The Mahoning Valley Industrial Council is a local trade association composed of 28 companies employing 44,000 employees.

My involvement with the Mahoning River started on February 15, 1935. For 30 years I have worked closely with local, state and National leaders to improve the waste resources of the Mahoning Valley. I will try in this paper to outline the progress made by the people of the valley in their desire to be good water resource development citizens. I believe they have proved their willingness to accept their public responsibilities, that they are proud of past accomplishments, and that they are looking forward to further improvement in water resources planned for the immediate future.

If any community in the United States is to make progress in the field of water resource development that community needs a dedicated and trusted leader with years of public service in his background. The Mahoning Valley has been fortunate to have such a public servant in Michael J. Kirwan, Congressman from the 19th Ohio Congressional District for the past 28 years. His efforts and leadership have contributed more than that of any other single person to the progress we have made and the progress we are making at this very moment in developing all of our water resources. I should also like to acknowledge at this point the significant roles of the Ohio Department of Health and of ORSANCO in helping to bring about this progress.

On January 22, 1965, in a speech before the Ohio Forestry Association Brigadier General Walter P. Leber, Ohio River Division Engineer, Corps of Engineers, U.S. Army, told of the Ohio River Basin Comprehensive Survey being made by his office. General Leber said the plan would be completed in 1967 and that its scope covered the next 50 years.

Years of work by the citizens of the Mahoning Valley has placed our water resources development program far ahead of other areas in its timetable of solid accomplishment.

To show our rate of progress in abating pollution and in development our water resources I must tell you about our history. Industrialization of the Mahoning River basin can be said to have had its birth in 1804 with the building of Hopewell Furnace on Yellow Creek southeast of Youngstown on land now a part of Struthers, Ohio. Charcoal made from nearby hillside trees furnished the fuel; kidney iron and limestone mined locally furnished raw material for the new iron industry. The opening of the Pennsylvania and Ohio Canal in 1839-40 furnished a transportation route and the new markets thus made available for iron resulted in a tremendous growth in jobs for the people living in the Mahoning Valley. From this small beginning the Youngstown District has become a vital component of the nation's steel industry, now having a rated steel making capacity of 9,160,000 annual tons of ingots.

As the iron and steel industry developed, the demand for water greatly increased. Water is required in huge quantities in modern steel operations. This water use can be designated briefly as follows:

1. Blast furnaces for making pig iron require a cooling water jacket surrounding the furnace.

2. Gases produced in the blast furnaces are "scrubbed" with water before the gas is used as fuel.

3. Open hearth steel making furnaces are jacketed with circulating water.

4. Electric power plants to turn rolls and to operate the cranes to lift the ladles containing hot metal require large quantities of condensing water.

5. Steel rolls must be cooled, and the huge tonnages of sheet steel made in the Mahoning Valley must be sprayed with great quantities of water under high pressure to remove scale.

Adequate water supply became a growing problem as steel production increased. Every expansion in steelmaking and employment was weighed against the availability of water to support the operation. The Youngstown Sheet & Tube Company constructed the Coalburg Dam and reservoir and use is made today of this raw water supply. The United States Steel Corporation used the abandoned coal mines on the Thomas Farm in Austintown Township as a source of water for the McDonald mills. This supply proved inadequate and it was abandoned in 1949. The Republic Rubber Division of Aeroquip Corporation still uses an abandoned coal mine for its principal industrial water supply right here in the City of Youngstown. Over the years the Ohio Water Service Company has operated with private funds to construct nine reservoirs having a total capacity of 22,000 acre feet. These reservoirs produce 30 million gallons of water daily of which 95 percent is sold for industrial use.

In the period prior to World War I local independent steel plants were being merged into huge nationwide integrated steel corporations. Plants located in areas enjoying an abundant water supply and low cost water transportation were less costly to operate than those located in the Mahoning Valley. Our leaders and our citizens realized that a struggle lay ahead if the Mahoning Valley was to avoid the fate of becoming a series of ghost towns. The need to keep and to expand the number of jobs available in our local steel plants caused our elected public officials and community leaders to undertake the expansion of our water resources. The cost was paid by local water users and taxpayers, with the steel industry prominent in both roles. Years of public discussion have gone into this effort and I am happy to report to you gentlemen that the voters of our area have supported the effort.

In 1914 during the period of the first World War the Mahoning River was an unregulated open sewer, with an inadequate volume of water. All sewage was dumped into the river without treatment of any kind. The fixed silt dams in the river necessary to keep water high enough to cover the intake pipes used for pumping water actually constituted a series of septic tanks in the open river. When high water came the flood water flushed out this series of open river septic tanks and thus moved our pollution down river as a burden to others. This condition, though hard to believe, actually existed 50 years ago.

The demand for steel during World War I aggravated the water problem in the Mahoning River. The integrated National steel corporations did not have time to build new steel-making facilities in other more favorably located areas of the country as they had planned. The war had to be fought with existing plants in existing locations. Therefore, all Mahoning River plants were forced into full operation. The river water was very bad and at this point in our local history the City of Youngstown constructed the Milton Dam and Reservoir. The project was started in 1916. It has an impounding capacity of 29,000 acre feet. The drainage area above the dam is 276 square acre feet. It has served our people well over the years and today it constitutes our best recreation lake because its water level is maintained during the summer season.

The improved river quality resulting from the construction of Milton Dam only increased the local desire to build more water impoundment dams. The consulting firm of Alexander Potter was employed in 1920 to prepare a comprehensive water resource development plan for the basin. This plan recommended additional reservoirs on the Upper Mahoning River. Dams were to be located on Eagle Creek, Mosquito Creek and Meander Creek, together with an intake structure on the West Branch of the Mahoning River.

Out of the public debate which followed the Potter report it was determined that our domestic water supply should be piped from a new reservoir to the city of use.

In February of 1926 the Mahoning Sanitary District was formed in accordance with the Sanitary District Law of Ohio. Money received from the sale of treated water is used to retire the bonds. The Meander Creek Reservoir has a storage capacity of 32,400 acre feet. The reservoir and treatment plant was completed in 1932 and it furnishes drinking water for Youngstown and Niles together with a large area outside the two cities. The yield from the reservoir is estimated at 30 million gallons daily based on the dry cycle of years 1930 to 1935. This supply has now been augmented by a contract between the Mahoning Valley Sanitary District and the Corps of Engineers, U.S. Army, providing for the purchase of part or all of an additional 34 million gallons daily from the Berlin Reservoir.

The City of Warren, Ohio, has arranged to purchase its domestic water from Mosquito Creek Reservoir. Thus, so far as municipal water supply is concerned, it is my pleasure to inform the conferees that in my opinion this problem on the Mahoning River in Ohio has been completely solved at local expense. The Mahoning River is neither used nor needed for a public water supply until it reaches Beaver Falls, Pennsylvania, some 30 miles below Youngstown.

Returning to the Mahoning River as a source for industrial water, the acute drought of 1930 resulted in daily river flows as low as 20 million gallons. During this period river water temperatures were recorded as high as 140 degrees Fahrenheit indicating the desperate need for additional low flow control, if the steel industry in this essentially steel community was to survive. Hydrographers wading the river were forced to insulate their wading boots with newspapers to withstand the heat.

The steel industry and the employment it provided could not be sustained over the years unless an improved river flow was developed. All of our state and local leaders were aware of the problem. The Ohio State Planning Board selected the Mahoning River basin for a comprehensive water resource study which was completed in 1936. The study recommended the construction of Berlin Reservoir and Mosquito Creek Reservoir and the construction of four primary sewage treatment plants. In 1939 World War II brought a tremendous demand for steel production in the Mahoning Valley with a resulting increased demand for industrial water. In 1936 and 1937 the valley was subjected to severe floods with a resulting loss in steel production. Out local and state leaders knew that multiple purpose reservoirs providing flood control and low flow control had to be constructed if the valley was to contribute its full share to the war effort.

For the first time the Federal Government became interested in flood control after the floods on the Ohio River in 1936 and 1937. A comprehensive flood control act was passed in 1938 which authorized flood control reservoirs on the Mahoning and the Shenango Rivers. After years of local effort our people were relieved and heartened to know that the Federal Government was at last ready to take an interest in our local water control problem.

Great obstacles were overcome in securing a Federal appropriation for the construction of Berlin Reservoir. This reservoir was completed in 1943. It has a storage capacity of 91,000 acre feet. Congressman Kirwan was in the forefront of this movement to develop greater water resource . He advocated the reservoirs in part for flood control in part to provide recreational facilities, and above all to satisfy the needs of the industry which supports the economy of this valley. Mosquito Creek Reservoir was completed in 1944. Mosquito Creek Reservoir has a storage capacity of 104,000 acre feet. These reservoirs are to be used according to the Congressional authorization of 1938 for low flow regulation, flood control and water supply.

In 1938, public policy in the development of our water resources was not clearly established or well defined. Our public officials at all levels of government were searching for criteria to be used in establishing benefits and cost-sharing responsibilities. Fred Waring, retired chief engineer for the Ohio Department of Health, was a pioneer in problem solving. Maurice LeBosquet of the United States Public Health Service, was a cooperative and able professional adviser in the field of Sanitary and Industrial Waste Treatment. The Corps of Engineers, U. S. Army, has relied heavily on Mr. LeBosquet's work over the years. The U. S. Geological Survey has furnished a long and indispensable record of data on stream flow, water temperature readings, and water quality data.

Over a period of more than 30 years, C. V. Youngquist, Chief of the Division of Water, Ohio Department of Natural Resources, has compiled, coordinated and evaluated many plans for developing the water resources of the Mahoning Valley. Significant contributions to progress also have been made by other state leaders, among them are Dr. E. W.

Arnold, Dr. Ralph Dwork, and George Eagle.

For 16 years Dr. Edward J. Cleary, Executive Director and Chief Engineer for the Ohio River Valley Water Sanitation Commission, has worked effectively in the development of regional water quality management. The dedication, understanding and knowledge of these men and their associates and the active cooperation of industry has been of immeasurable assistance.

Using a new yardstick to measure benefits the West Branch Reservoir is now under construction on the Mahoning River. It will be completed in 1966 with a benefit to cost ratio of 1.8 to 1. Its purpose is to provide "flood control, low flow augmentation and pollution abatement." The reservoir has a storage capacity of 78,700 acre feet and according to the terms under which it was authorized by Congress in 1960 Mahoning County and Trumbull County were required to contribute $5,200,000 toward its costs and operation. The Federal cost for flood control is $10,130,000 for a total cost of $15,330,000. I am pleased to inform the conferees that the local voters have authorized the payment of the local share of the cost, and this is specifically for the benefits of low flow control. This act is another manifestation of the desire of our local people to be good and cooperative citizens in developing our water resources, and making them available to serve the needs of the industry without which this highly industrialized community could not exist. This new reservoir will augment the minimum monthly average flow of the Mahoning River at Lowellville, Ohio, a point immediately above the Pennsylvania State line, from 275 cubic feet per second to 325 cubic feet per second.

Others will tell you of the progress made and of the plans under way to further eliminate industrial waste from the Mahoning River. The Ohio Department of Health maintains a close check on industrial pollution through its waste discharge permit system. The Ohio Department's program, in turn, is consistent with the policies established by the Ohio River Valley Water Sanitation Commission, functioning actively under an eight-state compact. Steady progress in this field is being made.

While I mentioned earlier that the first downriver point of use of the Mahoning River as a public water supply is at Beaver Falls, Pennsylvania, it should be noted that water also enters the Beaver River from the Shenango River as well as from the Mahoning River. These two rivers join to form the Beaver River. Construction of the Shenango Reservoir in Pennsylvania, a new flood control reservoir, will be completed in 1966 at a cost to the Federal Government of $34,800,000. It has 192,400 acre feet of storage capacity in it and it will augment the river flow at Beaver Falls, Pennsylvania, by 100 cubic feet per second on average. Surely the conferees will recognize this new water resource development as an event showing marked progress, and one that will enhance water quality through the dilution it will make available.

Congress has appropriated money to further develop the recreational facilities at Berlin Reservoir. The State of Ohio has extensive plans under way to further develop the recreational facilities at Mosquito Creek Reservoir and at the new West Branch Reservoir. Few people outside this area realize that the State of Ohio maintains a wild life area of approximately 5,000 acres immediately north and west of Mosquito Creek Reservoir. Hundreds of acres of land are planted in grain each year to feed geese as they migrate. I am told that as many as 200,000 geese have been observed at one time as they use this fly-way each year. I will not take the time to tell the conferees of all our recreation programs now under way in the Mahoning Valley, but I can make the general statement that we are well pleased with our developing facilities and the use made of them by the people.

Furthermore, I think I can say that with the recreation resources available to this community, the swimming pools, the reservoir areas, the extensive and wonderful Mill Creek Park area, it is ridiculous even to suggest that the shallow, highly-industrialized, workhorse of a stream called the Mahoning should be converted into a recreational area.

It is certainly too shallow for swimming, and maintenance of fish in the reaches from Warren to the state line would be wholly incompatible with the most efficient utilization of the stream in the best interests of the community -- that is, to maintain the industry which supplies the jobs that keep this community alive.

Moreover, it would be absurd to force the imposition of heavy taxes on the already heavily taxed residents of this valley, as would the expenditure of untold millions by industry, merely to make this short industrial reach of the stream suitable for fish life in the midst of this vast industrial complex. And it would be equally absurd and wasteful to incur the costs necessary to make the water in this stretch of the Mahoning suitable as a source of drinking water when the community gets its drinking water elsewhere.

We have our water resources under good control. Progress in pollution abatement is proceeding at an accelerating pace. But the 20 miles of industrial river from Warren to Lowellville, with its capacity for industrial cooling and for self-purification of industrial wastes, constitutes the industrial water life line on which the welfare of this community depends. This reach of the river serves the best interests of the area only if these capacities of the riverare fully utilized.

The people of the Mahoning Valley have always been aware of the need to develop our water resources to serve them as they seek to earn a living in the Mahoning Valley and as they seek to enjoy leisure time. Ours is a restless people but on the whole they have tempered progress with the cold realities of every-day living. We trust that the conferees will approve of progress made and that we shall be able to get on with the job of pollution control under the guidance of our long-established state and interstate compact authorities. I thank you, Mr. Chairman, and gentlemen of the conference.

... Applause...

CHAIRMAN STEIN: You know that was an excellent paper, Mr. Lloyd, but by the diminished applause, I think these fellows are weak and are going to have to go out and eat pretty soon. Let's see if we have any comments or questions. I don't want to hold anyone up from lunch but I think -- and by the way, there is one little point I don't get here.

What do you mean by self-purification of industrial lakes or do you want to wait until after lunch? Do you mean the acids get purified?

MR. LLOYD: Well, there are certain chemical wastes that do not have a characteristic that permits it to die away from the river water which, I grant you, as being a chemical fact. However, they are used up as they do work on other materials, shall I say, or other chemicals and they also are diluted. Not to my knowledge has there been anyone who has been injured from a public health standpoint as the result of the pollution that has come out of this river recently, and certainly with the number of facilities which are now coming into their full bloom, shall we say, as pollution abatement facilities, I think the quality of the Mahoning River and the Shenango River and the Beaver River will be greatly increased. I think we have made progress, sir, and I am very proud to have been a part of it and I think the people of the Mahoning Valley are also proud that they have done so well.

CHAIRMAN STEIN: Well, thank you. Are there any further comments or questions? Mr. LeBosquet, whom you referred to several times, is here and I think we are going to give him a chance to speak later.

MR. LLOYD: I am sure you should. He is a very accomplished professional person.

CHAIRMAN STEIN: Yes, I have known him for years. As a matter of fact, he taught me the business, maybe that's his one black mark.

... Laughter...

CHAIRMAN STEIN: I understand from shaggy dogs we have had roaming through the audience, that the consensus in the audience is to have a reasonable lunchtime. If this is the case, we will try to be back just about a little after or a quarter after 2:00.

We stand recessed for lunch. Thank you very much.

(Whereupon, a luncheon recess was had to reconvene at 2:15 p.m., the same day.)

AFTERNOON SESSION

2:25 p.m.

CHAIRMAN STEIN: May we reconvene. As we see the schedule, now, we are sure we will complete or there will be a completion of Ohio's presentation today and we will make certain that Pennsylvania's presentation is completed.

Now, in addition to that, time permitting, we will call on ORSANCO and, if time permitting, again, such of the other Federal agencies that may be available. We will probably have to wait until tomorrow for the Department of Health, Education, and Welfare's presentation.

Now, again I have been through these many, many times. The critical man here, I think, is the reporter. We may get testy up here or you may in the audience sitting around long enough but there is just so much that a single reporter can do in one day; I know that. What I am going to try to do is to look to -- depending on the way things go -- to recess as close to 5:00 as is reasonably feasible.

With this, we would like to call on Dr. Arnold again.

DR. ARNOLD: Mr. Chairman, with your permission, sir, I would like to put in the record that Mr. Kenneth Lloyd, who spoke here earlier this morning, is a commissioner of the St. Lawrence Seaway and also a former commissioner of ORSANCO.

Now, it is my privilege to introduce to you Mr. R. F. Doolitle, Vice President and General Counsel for The Youngstown Sheet and Tube Company, who will speak on behalf of all the steel companies in the basin. Mr. Doolittle.

MR. DOOLITTLE: Mr. Chairman, my presentation will involve the use of slides and I think this may necessitate some rearrangement of the seating as the only feasible place for putting the screen, it seems, is where the counsel are. Mr. Stein said they wouldn't mind relinquishing their places and sitting in the front area. I think the row that is here is not a suitable one and I would recommend that some space be cleared down further.

CHAIRMAN STEIN: Thank you very much, Mr. Doolittle.

MR. DOOLITTLE: Well, Mr. Chairman and honorable conferees and ladies and gentlemen, perhaps I should repeat for the record that I am speaking for the Youngstown Sheet and Tube Company.

The Ohio conferee, Dr. Arnold, and the other steel companies on the Mahoning, have asked me to tell you something of our pollution abatement programs. This means I'll have to explain a little about the waste disposal problems of the steel industry in this valley. As I do this, I want to tell you particularly about two things: first, the programs we have under way with the state for solving these problems so as to eliminate or control the wastes in our water discharges, and second, the very great progress we've been making under these programs in the past few years, and so upgrading the quality of the river.

The companies for which I am speaking are: Republic Steel Corporation, Copperweld Steel Company, Jones & Laughlin Steel Corporation, Pittsburgh Steel Company, Sharon Steel Corporation, United States Steel Corporation, and, of course, my own company, The Youngstown Sheet and Tube Company.

Mahoning Valley primarily a Steel Producing Center.

As you must know, the Mahoning Valley from Warren down to the Pennsylvania State line, supporting a population of some 509,000, is primarily a center of steel production and steel fabricating. There are nine steel companies with 15 major plants, including 63 rolling mills, along the river. Other industries exist, of course, but essentially this is a steel community, dependent for its existence on the production of steel, and on the prosperity of that industry in this valley. The giant mills that line the banks of this small stream for a number of miles account for nearly seven percent of all the steel produced in the Nation, and nearly every family in this community is vitally concerned, directly or indirectly, with whether steel in this valley is doing well or poorly.

We must also appreciate that the existence of the steel industry in this valley, and the employment that goes with it, is utterly dependent on the Mahoning River. The industry relies on this river, first, for enormous quantities of water needed for cooling purposes, and second, for discharge of certain of its wastes, and this is why the steel plants are all located right along the river's banks. Small as this little stream is, without it, and without its use as a workhorse, there would be no steel industry in either Youngstown, Niles or Warren.

Ohio's Program.

Now in 1952, a stringent water pollution control law became effective in Ohio. It established a Water Pollution Control Board in the Department of Health, with broad powers for developing and enforcing pollution programs. Some years earlier, in order to deal with interstate pollution, the State of Ohio had entered into a compact with seven other states bordering on the Ohio River or its tributaries. The Ohio River Valley Water Sanitation Commission (it's a long name, and we call it ORSANCO), was formed under this compact. Since then, for purposes of interstate control, the state has been functioning under regulations adopted by this Commission.

Immediately on its creation in 1952, the Water Pollution Control Board in Ohio moved to a waste discharge permit system, as contemplated by the Ohio law. Under this permit system no discharges are made to the river by any company or municipality without a permit. Separate permits are issued to each company covering each of its different types of discharge. The permits run for only a year at a time, and annual renewals for a company are always conditioned on its meetings requirements for scheduled improvements. These are established as part of an over-all program.

In other words, the state has utilized the annual permit system as a means of prescribing and enforcing feasible programs for each company. In doing this it has given separate consideration to the individual situation of each company.

For example, in the sewer systems originally constructed in some of the older plants, there was no separation of sewage from industrial wastes. They were all mixed together. For these companies, then, separation was a mandatory first step -- and a very expensive one -- in the abatement program. Diversion of human sewage from the river was a first priority, of course, and it had to be synchronized with the schedule for completion of the various municipal treatment plants that have been built along this river in the past few years. As you will see later, this important part of the program is now almost complete.

But where companies already had sewers which collected their sanitary sewage separately, it was appropriate for them to give first attention to other matters. So the state has set up entirely different orders of priority with different companies, but they all look toward the same ultimate objective, as part of the over-all program in this valley which Dr. Arnold and Mr. Eagle have described to you.

Participation by Steel Companies.

From the very start of this program, the steel companies have accepted responsibility for doing their part. I think it's important that you understand the degree of initiative and cooperation they've shown. First, they've felt they could assist in solving some of the technical problems encountered in developing truly effective, and economically feasible, facilities and in-plant practices for doing the job.

This has required both study and experimentation. Toward this objective, all of the major steel companies, and a large number of the smaller ones, have participated actively in the work of ORSANCO, through an ORSANCO steel industry committee formed nearly 15 years ago. With expert representation on it from each company, this committee set up subcommittees concerned with coke plants, waste acid, solids, and evaluation of toxicity.

So, also, a subcommittee on sampling and analysis has done valuable work in developing standard procedures for measuring and analyzing steel industry wastes, and for developing methods of odor evaluation in water. Getting agreement on means of measurement has taken time, but it's also brought about a better understanding of cause and effect, and of what needed to be done. After all, a program for improvement of the river can be no better than the data on which it's based.

These subcommittees have been working committees. A number of the representatives have devoted full time or nearly full time to this work. Their findings have been recognized and reported by ORSANCO.

On the strictly research side, the steel industry has maintained a fellowship at the Mellon Institute in Pittsburgh dedicated to the solution of many technical problems, and the fellowship has worked closely with these committees.

Some illustrations of the success of this cooperative activity will be seen in the adoption and installation of many of the committee findings in Mahoning Valley steel mills. These include, for example, definition of waste loads, drastic improvement in scale pit design, detection of organics, careful evaluation of over 50 pickle liquor treatment processes, and controls on coagulation of wastes.

Throughout all this, the representatives of the steel companies have worked closely with the staffs of ORSANCO and the Ohio Department of Health. Let me say again, their joint effort has been aimed at developing sound methods of control, and at exchange of information and understanding. The companies have felt it very important that treatment not be required in excess of what is clearly needed in the over-all public interest, also that any treatment facilities required will in fact accomplish the intended protection, and that they'll do it in an economical way, in other words, not provide "treatment for treatment's sake." We feel it important that when requirements are set, the over-all economic welfare of the communities they affect be kept in mind.

Accomplishment under Permit System.

Study and research have been only a part of the cooperation from the steel companies -- a necessary part to be sure, for obtaining sound results. Equally important has been their cooperation with the state in its administration of the permit system, and this has resulted in a record of marked progress and accomplishment in improving this river. Within the past three years, particularly, the improvement has been proceeding at an accelerated rate.

As I will show you with slides in some detail, the companies have developed programs for improvement of scale pits through special baffling of old pits and scientific design of new ones; they have located and closed up leaks in pipes and sewers carrying organics; they have pioneered improved techniques for separating blast furnace flue dust from the wash water; they have introduced facilities and procedures for dealing with acid wastes; they have constructed equipment which eliminates clean-out discharges at the coke plants; and they have segregated and diverted their sewage to new municipal treatment plants.

Progress under the permit system has been steady. It is significant that several years ago certain of the companies worked out planned five-year programs with the state covering their annual permit renewals. Under these programs they scheduled an orderly sequence of improvements -- with the heavy cost to the companies spread over a reasonable period of time, and with completion of the interceptor systems for sanitary wastes timed with the completion of the municipal sewage treatment plants.

We think the accomplishment has been remarkable. I would like now to illustrate with slides the specifics of the progress that has been made -- and to show you what is scheduled yet to be done. All the pictures I will show are facilities right hereon the Mahoning.

Blast Furnace Flue Dust.

One of the waterborne waste problems in the production of steel is blast furnace flue dust. Production of steel starts with smelting the iron ore in a blast furnace. (Slide 1) Coke is added for fuel and to reduce the ore, and limestone is added to pick up the impurities in the ore and permit a pour of molten iron.

To keep the process going, large volumes of hot air are forced into a number of openings near the base of the blast furnace. But as the air is piped away from the furnace, it carries some of the smaller particles of iron ore, and of coke and limestone, and this mixture, which must be disposed of, is called flue dust.

To prevent flue dust from reaching the river, different devices are employed. First, the gas is put through a "dry dust catcher" where some of the solid particles are forced out into a hopper. After the gas leaves this dry dust catcher, it is next put through a scrubber, where it's washed with a water spray that picks up more of the solids. The dust-bearing water is sent to a settling tank, or to a thickener, to permit "settling out" of as much of the dust as possible, and the clarified water is then finally discharged to the river.

However, until recent changes made by the steel companies, both the volume and the turbulence of water going through these pits was so great that a considerable amount of the flue dust failed to settle out. Consequently it went to the river in the discharge water.

To prevent this has been a challenge to the steel companies. But in the last few years their efforts have met with real success through development of the following three methods, all of which are now in use on the Mahoning:

(1) The first is by increasing the efficiency of existing settling basins. (Slide 2) This slide shows the dust-laden water flowing from the washer to the settling basin. To eliminate the flue dust from this dirty water was the objective. By diverting cooling water which contains no dust, and by installing new, more efficient methods of washing the gas, using less water, the companies have been able to eliminate nearly three-quarters of the volume of water that used to go to the settling basin. This has made use of the simple principle of reducing turbulence of the water in the basin, and at the same time being able to hold it there for a longer time, to let the solids settle out.

(Slide 3) Here is clarified water coming out of the settling basin. If you compare the clarity of the water in front of the white cardboard with the dirty water you saw in the last slide going to the settling basin, you can tell that the water coming out from these basins is now really clean.

(2) The second kind of facility is known as a thickener (Slide 4). This is a circular tank some 70 to 100 feet in diameter, which accomplishes the same result. It requires a good deal of space, and with its auxiliary equipment may cost up to as much as a million dollars, not to mention the cost of operating and maintaining it. It can also be employed in a recirculation system and that's the third method.

(3) Recirculation System. This has been made possible by new modifications in the method of washing the gas which now permit recirculation of the washer water. (Slide 5) Here under construction are two thickeners which are to be part of a closed recirculation system. The gas wash water is recirculated continuously instead of being discharged to the river. This particular unit will be completed this year. You may be interested to know that its cost is in the range of $2,000,000.

The water carrying the flue dust from the gas washer is piped to the center of the thickener. There is a second thickener in the rear. The solids settle out of the water as it moves slowly to the outer rim of the circular tank. There are rakes on the bottom which push the solids to the center, and from there they are pumped to filters located in the building under construction between the two tanks. In the basement of the new building there are pumps which will return the clarified wash water to the gas washer where it will be reused for washing the gas.

(Slide 6) An idea of the size of these units is given by looking at the men shown between the forward thickener and the tracks. As you can see, adequate space is one of the essentials for waste treatment facilities for many of the large operations in the steel industry. These pictures (Slides 7 and 8) graphically illustrate the lack of space available in many of the older steel plants, and this is one of the major problems presented.

(Slide 9) There's a lot more of this dust created in a blast furnace than you might think. Here's a pile of it that's been prevented from reaching the river. It will later be converted to sinter and recharged to the furnace, but any blast furnace man will tell you this is a mighty expensive method of producing raw material. The cost of running the process exceeds the value of any material it recovers.

Progress. Now for a report on the progress that has been made by the steel companies here in the valley to keep flue dust out of the river. There are 16 blast furnaces in the Mahoning steel complex. This bar graph (Slide 10) shows what has been accomplished to date and what is scheduled to be done. You will notice that in 1954, although there were some settling basins, none of the facilities were adequate. By 1959 adequate treatment has been provided at 25 percent of the furnaces to keep substantially all their flue dust from the river. By 1964 this percentage had risen to 75 percent. With the completion this year of the construction of facilities shown on the slides you have just seen, adequate treatment will have been provided for all the furnaces in the valley. Flue dust on the Mahoning River will then have been controlled.

Coke Plant.

Another source of wastes, this time organic wastes, is the coke plant. (Slide 11) Here in this battery of coke ovens coal is carbonized to remove the coal tars and gases, and this produces coke for the blast furnaces. (Slide 12) In this picture flaming coke is being pushed from an oven into a car which will take it to a quench station for cooling There are three active coke plants on the Mahoning, owned by two of the steel companies.

The gases and coal tars produced in the hot coke ovens are in turn processed through various units and recovered as by-products. If they escape to the river in sufficient quantity, some of these organic chemicals may create taste and odor problems in downstream water supplies.

Now here's a very interesting thing. One of the miracles of streams is that nature has endowed them with a remarkably high capacity for self-purification. They purify themselves of organics in different degrees, not only through dilution but also through oxidation and other chemical and biological action, during their passage downstream. This is one of the things that makes it possible to utilize streams for waste discharge at all. It is an economic resource which should be used, in the over-all interest of the community and the Nation.

Self-purification is particularly significant in this river in the area from Warren to below Lowellville, because of another circumstance peculiar to it. This is that neither Warren, Niles, Youngstown, nor any of the other municipalities in this section of the river use it for drinking purposes or public water supply. This is a very significant fact in any evaluation of proper utilization of this stream. The first use of the water for public water supply is at the Beaver Falls Water Company, nearly 50 miles below Warren, and 30 miles downstream from Youngstown. This is below the point where the waters of the Shenango join with the Mahoning, adding their volume and dilution to form the Beaver River.

For some years now the steel companies that have coke plants on the Mahoning have had a continuing and successful loss of coke organics to the river. They have all installed closed quench systems in which, instead of using water directly from the river, they use the waste water from the by-product recovery to quench the coke when it is removed from the ovens. This destroys the organics in the waste water by oxidation.

Beaver Falls water has, nevertheless, on a few days during the year had chemical taste, sometimes of a medicinal nature, sometimes tarry, and sometimes other chemical characteristics. Some of the steel companies on the Mahoning, who were determined to learn more about the causes of this, decided in 1953 to undertake a program of studying the river. (Slide 13) With the support of the Ohio Health Department and the complete cooperation of the Beaver Falls Water Company, they made extensive surveys over a three-year period from 1953 to 1956. I want to tell you a little something about this. The results were astonishing and they gave new impetus and direction to the prevention programs at the coke plants.

The purposes of the survey were first, to study the self-purification potential of the river, second, to determine whether correlation existed between the coke plant discharges and the taste and odor occurrences at the water works, and third, to study the effect the treatment process at the water works had on certain organics. The companies did this on their own. And they used very exacting techniques. Extensive sampling and analysis was made. Hourly samples were collected 24 hours a day every day at each of numerous sampling points over extended periods of several months in the wintertime in each different year. (Slide 14) These were analyzed in the laboratory, and so were frequent grab samples as well. Time of passage in the river from Youngstown to Beaver Falls was carefully measured at different flows.

The results showed three main things: (1) remarkable self-purification of the organics during passage, (2) no correlation whatever between ordinary coke plant discharges and taste and odor at the water works, and (3) and most significant, very clear correlation between these taste and odor occurrences and upstream clean-outs or other slug discharges of organics, whether they came from coke plants or any other source. What this demonstrated, then, was the vital necessity to avoid discharges from clean-outs of sumps and tank bottoms.

The companies have acted on this information and taken steps to eliminate these sources. For example, at one plant (Slide 15) napthalene, which used to be collected in sumps such as these (Slide 16) and occasionally flushed to the river, is now included with the tar by-products which are sold. Other materials (Slide 17) which used to be wasted, have now been absorbed or eliminated by changes in process.

The companies also turned their attention to the possibility of leaks in the coke plant cooling operations which might cause unintended discharge to the river, and there is now constant surveillance to prevent leaks from occurring.

Progress. (Slide 18) The effectiveness of this program is demonstrated by this chart which shows from 1954 to 1964 the decrease in number of days in the year when the Beaver Falls Water Works had a chemical odor. In 1954 there were 43 such days; and in 1958, this had been reduced to 22; and in 1961 and 1964, only six during the year.

During the years 1959, 1960 and 1962, modifications were being made at various coke plants to eliminate trouble spots. This of course caused unavoidable heavy discharges to the river during the periods of construction. That work is now completed, and the coke plants have adequate controls to prevent discharges from clean-outs.

As protection against the risk of leaks or breaks, a report system has been set up to alert the Beaver Falls Water Company, the Ohio Department of Health and ORSANCO if a leak or other emergency does occur at any time, night or day. This gives the water company an opportunity to adjust treatment practice temporarily, if it should be necessary.

Looking toward the future, and as a part of their continuing program, the steel companies on the Mahoning now also have a survey under way employing techniques developed at the Mellon Institute to trace organics. The purpose is to determine possible sources of loss of organic material on the Mahoning or the Shenango Rivers which might still be cause for concern.

One more point about the quality of the water at Beaver Falls. While there have been occasional occurrences of unpleasant taste, no one has ever before suggested that the Beaver Falls water supply is in any way unsafe for drinking. We have always understood, and the Beaver Falls Water Company will confirm, that no question of health is involved.

Rolling Mills.

We now move from the coke plants and blast furnaces to the next step in steel making. (Slide 19) The iron from the blast furnace is processed in furnaces such as these open hearths where the impurities are removed and elements are added to give the steel its desired properties. There are no waterborne wastes from the open hearths.

The molten steel is poured from the furnace into molds, to form ingots. (Slide 20)

The ingots later are reheated and while at white heat are rolled to the desired shape through a succession of rolling mills. (Slide 21) Here is a heated ingot headed for the blooming mill.

Now when heated, the hot steel oxidizes rapidly, and scale is formed. This is removed by high pressure water sprays and by the pressure of the rolls, and here we have another one of steel's major waste discharge problems. (Slide 22) The problem arises on any rolling mill. Here's a hot strip mill.

One of the newer developments to reduce the need for water for removing this scale is a dry drag (Slide 23). Here a drag on a long cable sweeps or pulls the scale from under the mill to a belt which in turn carries it outside the mill without the use of water. This picture (Slide 24) shows what scale looks like that's already been removed from under the mill by this means.

Most of the scale, however, is flushed by water to a scale pit where it can settle out on the bottom of the pit.

In the older mills these pits are small. (Slide 25) Their purpose was simply to protect sewers from plugging. Here for example is a pit about 10 feet wide and 15 feet long. Others are even smaller.

In order to separate the mill scale and prevent it from being flushed to the river, the scale-bearing water has to be slowed down and held long enough for the scale to settle out. One of the accomplishments of the companies in their cooperative efforts under the state's program has been the development of methods by which the efficiency of existing pits has been enormously improved. Here for example (Slide 26) is a pit in which baffles have been constructed to slow down the water and eliminate turbulence, to give the scale an opportunity to settle. Where baffling would be effective, it has been installed in pits on the Mahoning.

This also permits collection of oil through separation as it rises to the surface in a quiet section of the pit. In the foreground of this picture is the pump for removing oil as it accumulates on the surface of the pit. (Slide 27) Here is an illustration of the manner in which the oil collects behind these baffles near the far end of the pit. This pit is actually located down underneath the operating floor of the mill. It's an example of one of the older pits.

When pits are too small for modification, and there is no room for a new pit, the discharge from one or more existing pits has sometimes been carried to a new basin. (Slide 28) In this instance the discharges from the inadequate pits in some 12 mills were collected and handled through a large settling basin. This pit is as long as a football field and 30 feet deep. (Slide 29) Periodically, the scale is cleaned out of it, and here is the amount of scale this pit has kept out of the river over a two-month period.

In newer mills the scale pits are adequately sized (Slide 30). They have to be very deep to collect the scale-bearing water from the sewers located below some mills. (Slide 31) In this instance, the pit is 41 feet deep. It's 129 feet long, and 25 feet wide. To support the weight of the adjacent mill equipment, special structural designs were required. The baffling is below the water level where you see two cross-beams. At the far end there is a pump to lift the accumulated floating oil to the tanks in the upper right, and the pit is so deep that the clarified water has to be raised by pump to the sewer. The cost of this pit was nearly a million dollars. And this is only one pit for one rolling mill in one plant.

Recirculation of the water may sometimes be feasible where space is available. (Slide 32) Here, in a new mill, there is settling of scale in an adequately designed scale pit, and then a recirculation of water through a cooling tower (Slide 33), and then further cooling in a lagoon (Slide 34). Pumps (Slide 35) return the water from the lagoon to the mill. You can see the amount of space all this requires, and yet it's serving only one of several rolling mills in a single steel plant. Because of space limitations, this approach is obviously not feasible for most of the mills in the Mahoning Valley.

Loss of lubricating oil in old mills is a continuing problem and is receiving prime consideration. Newer mills don't lose much oil because advancements have been made in methods of lubricating bearings, and also because today when new scale pits are constructed, adequate oil facilities are built right in. (Slide 36) The belt-type unit shown here was developed by one of the companies on the Mahoning. (Slide 37) And here is the conventional oil skimmer, used where the water level in the pit can be held constant.

There's a different oil problem in cold rolling mills. There (Slide 38) the steel strip is not reheated before stretching or rolling, so soluble or emulsified oil is used for lubrication, and the resulting oil-water solution is recycled on the mill. (Slide 39) Here the solution comes in at the side, and the scale is removed by a continuous scraper going up the incline you see in the background.

Within the past few years, great progress has been made in developing equipment such as shown here (Slides 40 and 41) to clean these solutions and thus prolong their life.

You can see that the waste discharges from rolling mills are both mill scale and oil. The prevention of either one from reaching the river is intimately connected with the other.

Progress. What progress have the companies in this valley made in controlling the discharge of mill scale and oil? (Slide 42) If you'll look at this bar chart, you'll see that in 1954, only 13 percent of the mills in the Mahoning Valley had adequate facilities for this purpose. By 1959, there were still only 33 percent of them that did. By 1964, this figure had risen to 76 percent. An additional five percent are scheduled to have adequate treatment by the end of next year. This will make a total of 81 percent of the mills of this valley. The remaining 19 percent are old, marginal mills facing possible replacement or abandonment.

Cleaning.

We come now to the cleaning processes in steelmaking. When steel is cleaned in acid solutions, it's called pickling. (Slide 43) In this picture you see a modern pickling line. The steel passes through a series of acid tanks as it moves along the length of this line, some 830 feet. This removes oxides and scale and prepares the surface for coating or plating. During the process the strength of the acid is reduced. When it becomes too weak to clean effectively, the acid, called spent pickle liquor, is discarded. Disposal of spent pickle liquor has been a major challenge to the industry for many years. Extensive study and experimentation have been lavished on the problem.

Where land is available (Slide 44), lime neutralization is employed by some plants on the Mahoning. The resultant slurry settles in a lagoon, or is hauled away.

(Slide 45) Another method used here, where space is available, is neutralization on slag dumps. Again, a lagoon holds the slurry. But see how much space this requires.

Where space is unavailable, and this is true in most of the older, crowded plants in this area, a system of continuous discharge has been instituted in the last few years as an interim control. By this method, batch dumping is avoided, and the rate of discharge to the stream is reduced to a trickle. This line (Slide 46) operates on this principle. The natural alkalinity in the Mahoning reacts with the dispersed acid, and by neutralization destroys it, and in this way eliminates the corrosive effect.

Progress. By one of these methods or another, the corrosive effect of acid has been eliminated at all operations on the Mahoning except two. In both of these, control facilities are scheduled for completion this year.

There is still the problem of dissolved iron salts which result from pickling, and the industry has carried on a continuing effort to find a feasible answer to this problem.

A new process has recently been developed which is the first major breakthrough in this problem. It's a method of acid regeneration which utilizes hydrochloric acid in a vertical tower. Interestingly enough, it's an outgrowth of a pilot plant experiment a few years ago at Niles, Ohio. There eight steel companies joined in an investment of over $800,000 to test a related method for acid regeneration, but like so many others, that turned out not to be practical. Yet the work done there has led to the development of this new vertical process, and a new mill in Alabama is successfully using it to convert the spent acid to fresh acid and iron oxide.

Possibilities are now being evaluated for adapting this process to the kind of pickling lines in use on the Mahoning.

Representatives of the Ohio Department of Health have been kept acquainted with these developments and have visited the operation in Alabama. When the test work now under way on the Mahoning is completed, a report on the possibility of a program will be made to the state.

Plating.

Another steel-related activity that has waste problems is plating. In addition to their major steelmaking, a few of the steel companies on the Mahoning also have minor plating activities. These include electroplating of brass, copper or zinc on steel. In each instance on the Mahoning there is adequate collection and treatment of the waste. (Slide 47) Special intercepting sumps are used to eliminate possibility of an accidental spill.

Cooling.

Perhaps some mention should also be made of water temperatures. When water is used for cooling -- and 90 percent of the water pumped into a steel mill is used solely for that purpose -- it picks up heat. Mr. Lloyd has described to you the history of development of upriver water storage in the Mahoning basin. This history has demonstrated the necessity for a large, continuous supply of water to be available for cooling in the steel mills if this valley is to prosper, and employment here is to flourish.

Two methods of obtaining cooler water have been used on the Mahoning. The first is by cooling towers (Slides 48 and 49); the second is by increasing the flow in the river. Neither method is inexpensive.

The minimum flow in the river in dry weather is now about 125 million gallons per day. But the total water pumped by all the steel plants on the Mahoning adds up to some 800 million gallons per day. Of course, this becomes possible only because each plant returns its cooling water to the river, so the flow in the river isn't substantially reduced. It's an interesting observation, though, that this total steel company pumpage amounts to more than the entire volume of water required for ordinary water supply for the whole population of Ohio.

Now, apart from the problem of space, if cooling towers were used by all the steel companies on the Mahoning, then up to 60 million gallons a day would be evaporated into the air, and thus permanently lost from the stream. During dry weather this would mean nearly half the flow in the river would be lost, and as a result all the new municipal treatment plants so recently built at taxpayers expense would then become inadequate and have to be enlarged.

The steel companies in the Mahoning basin know well the economic advantages of colder water for cooling. But they also recognize that this is but one factor in evaluating the economics of an area. This area is already heavily handicapped by old facilities, lack of water transportation, and distance from important markets. By supporting local bond issues the people in this community have been willing to join with industry in financing the cost of reservoirs to provide low flow augmentation benefits on this river. This is eloquent evidence of their interest in preserving the river's capability to serve industry and employment, as well as recreation, in this valley.

Sewage.

I come now to the disposal of sewage. Public health is the primary objective in any pollution abatement program, and this means sewage disposal from sanitary facilities rates first priority.

As I mentioned earlier, the sewer systems underlying many of the sprawling plants along this river carried both plant sewage and industrial waste combined. To prevent the sewage reaching the river, it had to be separated and diverted to the municipal disposal plants that have been constructed over the past few years. Now if you've ever seen a sewer being laid, and the streets and roads torn up, you can imagine what all this digging inside a crowded mill area would mean. Virtually every roadway in the plant, and often the mill floors, had to be torn up. (Slide 50) Here is a typical layout to show how extensive the disruption was. The plant in this aerial photograph is about two and one-half miles long. This company had to lay six miles of interceptor sewers inside its crowded plants on the Mahoning. To be sure, it's a job that had to be done, but it's been a major effort, running into many millions of dollars for the steel companies.

Under the Ohio permit renewal system, this sewer construction has been geared to the timetables of the municipalities for completion of their sewage disposal plants. At the start of this program 12 years ago, in addition to the municipal sewage, sewage from 35,000 employees of the steel companies was discharged to the Mahoning.

The progress in connecting this waste to municipal treatment plants is shown here. (Slide 51) You'll see that in 1954 all sewage went to the river. By 1959, 16 percent of the sewage from the steel mills was connected to municipal treatment facilities. By 1964 this percentage had risen to 85 percent, and by next year it will be 100 percent. The job is thus now virtually finished, timed with the completion later this year of the municipal disposal plants themselves, and their connecting lines. This is a major achievement in this valley, and it's been accomplished by the state, the cities and industry all working together.

Program Time.

A program of the scope I've described could hardly be accomplished overnight. Its cost, running into many millions of dollars, had to be spread over a period of years if the economy of the area were not to be adversely affected.

Then, too, lack of space in the crowded mills along the Mahoning has made some control measures impossible. Others are economically prohibitive for certain of the older, near-obsolete facilities that are still supplying jobs in this area. Whether to install a new, revolutionary facility or process, or to prolong the life of a unit approaching obsolescence, is a difficult decision to make -- one that requires time as well as capital. So also, some of the technical problems involved in controlling certain of the steel industry wastes have required study and experimentation. All the problems are not yet solved, but as a result of persistent effort, solution seems well on the way.

Conclusions.

To summarize, if ever there was an area in which a vigorous pollution abatement program is in effect, and remarkable progress is being made, it is on the Mahoning River. The annual permit system administered by the Water Pollution Control Board of Ohio, and the policies established by ORSANCO, have been highly effective. These authorities seek to accomplish the objectives of pollution abatement through well-conceived and adequate measures which give recognition to problems peculiar to this industrial area. Far from being recalcitrant, the steel companies have taken the initiative in working with the state and ORSANCO to make this program possible.

Recognizing that effective area controls could not be developed without sound data relating cause and effect, they've put men to work to obtain that information.

The few problems not yet fully solved may require major decisions on method of operation, and in some instances the only alternative would be discontinuance of operation and loss of jobs that go with it. Meanwhile, these problems are not interrupting the progress of the abatement programs under way in accordance with the state permit requirements.

Here then is the scoreboard of our progress and accomplisment in brief:

Blast Furnace Flue Dust - in 1954, none adequately treated, 75 percent treated now; 100 percent will be adequately treated by next year.

Coke Plants - in 1954, inadequate controls; by 1964; all known sources of waste under control; program now under way for tracing other sources which occasionally cause chemical taste or odor at the Beaver Falls Water Works. Completion expected by next year.

Rolling Mill Scale and Oil - in 1954, only 13 percent adequately treated; 76 percent treated now; 81 percent will be treated by 1966; answers for the remaining 19 percent depend on disposition of the mills.

Acid - in 1954, little adequately treated; neutralization with lime or slag now provided where space is available; where it is not, removal of corrosive effect is now accomplished by controlled rate of discharge at all rolling mills except two; programs for these two now scheduled for this year; evaluation of a new method of pickling which would eliminate discharge is under way. Definition of final program expected by next year.

Plating - in 1954, no treatment; all mills now have adequate treatment.

Sewage - in 1954, almost all sewage from 35,000 plant employees went to the river; by 1964, 85 percent connected to municipal treatment; by next year, 100 percent scheduled for treatment. I would like the record to show that during the entire three weeks of this discharge of the untreated industrial waste running to as much as 14,000 ppb of phenol, there were no occurrences of taste and odor at the waterworks at Beaver Falls.

Ladies and gentlemen, the steel companies along the Mahoning believe they are neither immodest nor unrealistic in pointing with pride to their dramatic record of accomplishment on this river in the past 10 years. They've made this progress under a planned program which is a credit not only to them, but to the leadership provided by ORSANCO and by the State of Ohio.

... Applause ...

CHAIRMAN STEIN: May we reconvene. While I was listening to the excellent presentation of Mr. Doolittle, a lot of people in the audience kept raising the same question and this was referred to in Mr. Doolittle's talk, and that was in referrence to low flow augmentation. Also, we have had little staff members, Trixie and Bubbles, going through the audience and evidently they have had these requests too.

Now, I think the notion of low flow augmentation has arisen since most of the rivers or an increasing amount of rivers in the country no longer are regulated streams. That is, they are not free-flowing streams. I think you may have heard that in the history that Mr. Lloyd gave of the Mahoning River of the condition here, for example, in the --- before World War I. Or you would take the Missouri or the Mississippi where you would have drought. They would attempt to regulate the flow to keep the flow relatively even for a majority of water usages and various water uses and for uses such as navigation, flood control,power and so forth.

Now, one of the uses in quality control, and at key points in a river's regiment, water is released very often for the purposes of quality control and, in order to maintain the quality of a river, you can sometimes use the energy such as you use for,say, an electric utility. The electric utility has to be built so that its peak can fill the needs for peak demands.

For example, at four o'clock in the winter afternoon, while the men are still in the offices turning on the lights and in the factory, and the women are at home turning on the TV and often the radio, there must be sufficient juice to come through.

During the same periods, during the period of low flow where the quality of it might sink if even given the best treatment, if you wipe out all the life, it is hard for the river to come back; and sometimes provision is made at these periods of low flow for augmented low flow.

Now, under the Federal Water Pollution Control Act -- and I want to make this very clear about what the Federal Policy is -- in survey of planning of any Federal reservoir or county, it says "that consideration shall be given to inclusion of storage for regulations of stream-flow for the purpose of water quality control."

This is Section 2(b) of the Federal Water Pollution Control Act. "That consideration shall be given for storage of streamflow for the purpose of water quality control," - here is the key point: "except that such storage and water releases shall not be provided as a substitute for adequate treatment or other methods of controlling wastes at the source."

Now, another section of the Federal program handles this and I think this is what was alluded to before the Mahoning report of this morning, but they have made a determination that adequate treatment means for purposes of providing augmented low flow, secondary treatment, or its equivalent. In other words, if you are not providing at least secondary treatment, it is not going to be recommended Uncle Sam give you free water for dilution or any water for dilution. It is up to you to provide secondary treatment first.

I just say this because evidently this is a relatively arcane area of discussion and references have been made to it.

Now, if we can turn to Mr. Doolittle's presentation. Are there any comments or questions?

MR. POSTON: Mr. Chairman, I have some questions here. First off, this morning, at the time

Mr. Eagle made his presentation and gave us a copy of his report, I indicated that I would like an opportunity to comment on it after I had had a chance to look. And I find that there are not included in this report information on specific details of effluents from industrial waste treatment works. This information is essential if we are going to make an engineering appraisal of the conditions in the stream and what might be done.

For example, I think it is necessary for us to know the flows from specific industries, volume-wise, plus the amounts of phenols, the amounts of scale, the amounts of cyanides, solids, acids that might be in these particular flows and, I think, these are essential if we are to do -- make a sound evaluation of this particular problem.

CHAIRMAN STEIN: Sir, I wonder if we could perhaps hold that for the purpose of the record. I wonder if we could direct ourselves to Mr. Doolittle's statement because I would like to have the comments on that as close to the statement on the record as we can get it.

MR. POSTON: All right. I could see by the pictures that Mr. Doolittle, not as his name implies, do little, he has done a lot in particular for Youngstown Sheet and Tube in the way of providing waste treatment and bringing to us today a story of activities with regards to waste treatment. I do have some questions that I would like to ask of Mr. Doolittle.

I got this story quite rapidly here and I made a few notes. I think one of the items of leaks and sludge and dumping into the river that causes the taste problems in the vicinity of Beaver Falls is of interest and I wondered whether or not in this reporting service how many times during this past year has it been necessary to report to the Beaver Falls and to the state that some dumping of sludge or leaks have caused problems that might be felt in Beaver Falls?

MR. DOOLITTLE: Do you want me to answer that, Mr. Poston? I think the gentlemen is here who may have the figure. Mr. Wallace, at the back of the room, may have it.

CHAIRMAN STEIN: By the way, I hope these people will identify themselves.

MR. DOOLITTLE: This is Mr. DeYarman Wallace of the Research Department of the Youngstown Sheet and Tube Company.

MR. WALLACE: In 1964 we had three occasions in which we contacted the Beaver Falls water treatment plant and informed them that there had been an emergency discharge upstream. They recognized this and they were prepared for it; immediately set up a monitoring system to trace this all the way down. Fortunately, it did not reach Beaver Falls. It died away by the time it reached Lake Jackson Bridge which is just before the concurrence of the Shenango and Mahoning River.

MR. POSTON: This monitoring and this recording system in which you notified the state, is this just Youngstown Sheet and Tube that carries this out or do other companies participate in this?

MR. WALLACE: All the companies participate in this and we are the ones who are the workhorses and carry it out. In other words, we act as the alert agency.

MR. POSTON: Then the three times that were reported --

MR. WALLACE: They did not involve Sheet and Tube alone.

MR. POSTON: They did not come down from Youngstown Sheet and Tube but from one of the others?

MR. WALLACE: That's right.

MR. POSTON: Do you care to comment on, are these all from one company?

MR. WALLACE: No, they are all from different companies.

MR. POSTON: Do you care to name those?

MR. WALLACE: I don't care to name them at this time.

MR. POSTON: As I have indicated previously, we are concerned with obtaining data relative to effluents. Would your company be willing to give us information on industrial effluents and the amount of waste?

MR. WALLACE: This would have to be cleared with our management.

CHAIRMAN STEIN: Which company are you with?

MR. WALLACE: I am with Youngstown Sheet and Tube.

MR. DOOLITTLE: I thought Mr. Cleary in effect gave you reasons that in effect answered your question, but since you have asked it of us directly, I would be happy to add something to what Mr. Cleary said.

I might say that I am speaking only for the Youngstown Sheet and Tube Company but I would like to comment with respect to something you said a moment ago when you were kind enough to say that I had indicated that our company had done many things for the improvement of the river. I want to make it clear that my talk this morning and the figures and the charts represented the work that has been done by all of the companies on the river and not solely by my company.

Now, with respect to the matter of effluent data, Mr. Poston, I understand that you have certain responsibilities and that you have set up methods that, in your judgment, are correct for discharging those responsibilities and that you are very interested in obtaining from individual companies their individual effluent discharge data. I think, as everyone knows, in Ohio we are subject to stringent regulations in the State of Ohio and we have filed with the State of Ohio elaborate information and reports on our effluent discharges. Not only elaborate, but quite frequent with our annual renewal permit system.

Under the Ohio law, that information is, as it probably should be, in our opinion, kept confidential because it is in part competitive information, and it is information which we share with regulatory authority which has jurisdiction over us.

It is not given to them with the idea that it would be made available to the public or where our competitors could make use of it.

Now, it is my understanding -- and correct me please if I am wrong -- that the Department of Health, Education, and Welfare has made it amply clear that effluent data filed will not be kept private and it will be disclosed to the public, and it is your view it is your obligation, and it is for this reason, if no other, we are unwilling, sir, at this time, to make effluent data available to you.

Now I would like to say this so that there is no misunderstanding about this.

We seek to cooperate with duly constituted regulatory authorities in seeking the ultimate goal of improving the quality of this river. It is my understanding that the jurisdiction of the Federal Government under the present Federal Water Pollution Control law contemplates that the Department of Health, Education, and Welfare may well come into an area to hold a conference as it has here if it finds,from whatever study reports it may make, as a matter of fact, even before it finds, if the Secretary has reason to believe that there is interstate pollution. In our situation that means pollution originating in Ohio and flowing down into Pennsylvania which endangers health or welfare.

Now, I assume, Mr. Poston, that this conference would not be called if you did not have such information and had not reached the conclusion in your own minds that interstate pollution of this kind existed. I think it is very clear that we dispute that supposition but you must have reached that conclusion in your own mind or there would have been no reason for calling the conference.

Now, sir, since you have available, from whatever sources you may have obtained them, information which authorizes you, under the law, to call this conference, we find it difficult to understand why it is necessary for you to have individual company effluent data in order to carry on this conference.

We are here, the conference is here. Now, what is the purpose of this conference? As I understand, under the statute -- and perhaps Mr. Stein will differ with me -- the purpose of this conference is first to determine the extent of the pollution in Pennsylvania. We find it difficult to understand why it's necessary to go to the individual company discharges up in this area in order to determine what the extent of that pollution is 30 miles downstream in Pennsylvania.

I commented earlier about the self-purification or a similar capacity of the stream. The report which you circulated just as an example showed, I believe, two and a half parts million of fluorides up in this stretch of the river; when it reached the first waterworks 30 miles below it had diminished to seven-tenths per million. And this is within the optimum of this, a desirable amount. This is not as great as the desirable amount.

So it would seem to me, sir, that your responsibilities could be adequately discharged by making your studies and your analysis at the point at which you are supposed to be concerned before this conference is called.

Now, what is the function of this conference?

As I understand it, the issues before you now, in addition to the extent of pollution in Pennsylvania, are: Are there adequate measures being taken by the duly constituted regulatory authorities for dealing with this situation?

The Federal Government is not supposed to intervene, as I understand, unless they find the jobs not being done by the regulatory authorities in the interstate agency. So our inquiry, it would seem to us when we refused your request -- and we did refuse the request for the reasons I stated -- it was confidential information we did not want to disclose to our competitors. The reason this conference is called, the issue here, then, in addition to the extent of the pollution in Pennsylvania and the adequacy of the measures, is what is the progress that is being effected. And certainly after the reports you have heard, Dr. Arnold, Mr. Eagle, and the Mayor's and Mr. Lloyd and all the others, including our industrial presentation, we find it very difficult to understand how anyone could reach the conclusion that there are not adequate measures and that effective progress is not being made.

And I understand, sir, that the jurisdiction of the Federal Government to proceed further in the matter of regulation is not a jurisdiction to go to individual companies to find where particular pollution is coming from. It is a jurisdiction to deal with the question of what is the pollution in Pennsylvania, at this time, and unless you make further findings of inadequate measures and of a lack of progress, there is no authority in the Federal Government to go to the next step of a public hearing and to go after the question of responsibility of individual companies for enforcement.

Have I answered your question, sir?

... Applause ...

CHAIRMAN STEIN: Mr. Doolittle, I wouldn't disagree with you on the purposes of the conference, but I think we have a question of both Ohio and Federal law, I think we have to consider. The first thing is not whether Mr. Poston or anyone else believes there is interstate pollution; it is whether the Secretary has reason to believe. The Secretary has so stated that he has reason to believe that.

The second point is, under Ohio law, the law, as I read it, states that this information cannot be given unless we get permission of the industry concerned. Their permission was turned down. I might point out that in our dealing with 700 industries throughout the contry, including many, many major industries other than the steel industry, we have never had a major industry refuse this information to the Federal Government. This is our first experience in the entire country where we have had this refusal, and

I think that this is a rather significant issue.

Now, the next point is, I think, our technical people will be making a report. I have hoped that, at least, I have attempted not to draw any conclusions - and I don't think I have - until all the facts are in and our technical people's report is in. It seems to me that you are convinced that adequate progress is being made before you heard our technical people and our presentation.

Now, may be you can make this determination elsewhere but, as I see this, when pollution is coming into another state, the key point is to trace that - our technical people - to the individual sources. I think, as a part of National policy in pollution control, it is felt that this has to be traced back to individual sources and this, I think, we have to give our technical people an opportunity to make their presentation to see why they think it is so. If you give us the information, we are sure going to make it public. We have no need for confidential information. I can't see what use confidential information would be to a Federal regulatory agency. If we can't make that information available to the public, we don't need it.

MR. DOOLITTLE: Mr. Stein, I don't want unduly to prolong this discussion but I would like to answer one or two things you have said.

CHAIRMAN STEIN: Yes.

MR. DOOLITTLE: You consider that effluent data is a part of the province of the Federal inquiry, at this time. We differ with you on that as a matter of principle. We have not withheld information that the State of Ohio has asked from us. And the law in Ohio apparently has a different approach to this than the one you have expressed because the legislature of Ohio has seen fit to make this information confidential as between us and the agency to which we report it.

Now, one further observation. Granted that if the time comes when your function becomes one of enforcement against individual companies, at that time it will be necessary, of course, for you to have data, but as I have read the Act -- and I could be wrong -- it seemed to me that your inquiry at this time is solely one into -- so far as the pollution involved is concerned -- is solely one of whether there is interstate pollution into Pennsylvania, and we cannot see for that inquiry there is any necessity for you to examine into the individual contribution of different facilities and different places. It has seemed to us that that inquiry could be inspired only by a desire to go back to those particular companies, and it is our feeling that that is still the function of the state by which we are severely regulated and of the interstate commission which, under an eight-state compact, has been delegated authority to deal with these questions; that this is not yet a Federal question unless and until it develops that the state and the interstate agencies are not doing the job; their measures are not adequate progress.

When that time comes and you then move under your enforcement procedures to a public hearing, it may well be that then individual responsibility for a situation will then have to be proved and proved before a board and ultimately before a court decision which we have denied.

Individual responsibilities for such a situation will then, of course, be relative to the inquiry. We do not believe the purpose of this conference is to inquire into the responsibilities for the individual sources of whatever you may find in Pennsylvania.

CHAIRMAN STEIN: Thank you, sir. I would like to again make this very clear. I do not say, as might have been indicated, that the effluent data was necessary. What I said was that our technical staff believed they had to have the technical data in order to make a meaningful or most meaningful report in this situation. Again, sir, without attempting or wanting to dispute with you the meaning of the Ohio law on the subject, I would like to have, at this point in the record, the pertinent section of the Ohio law inserted in the record. I think we are both familiar with it.

If anyone knows what that law is, offhand, perhaps we can have it.

MR. COMPSON: For the purpose of this record, I would suggest that you insert into the record that a question was specifically made to the Department to divulge data on certain industries in this valley which we refused and, in the letter in response to this request, the pertinent portions of Ohio law are quoted and this letter was sent to Mr. Poston by certified mail, return receipt requested.

May this go into the record?

CHAIRMAN STEIN: Yes, that may. May I have a copy of that letter? Without objection, the pertinent copy of the letter will go into the record and the pertinent section of the law, as I indicated.

"Attention: Mr. H. W. Poston

"Re: WS&PC

"Dear Dr. Mangun:

"Your letter of January 18, 1965, to E. W. Arnold, M.D., Director of Health, has been referred to this office for consideration and reply.

"Thank you for commending this Department on the operation of the stream monitoring stations which we have in operation of the Mahoning River. This is but one example of the continuing interest and activity of the State of Ohio with regard to water pollution abatement and control in the Mahoning River basin.

"In your letter you state that you do not believe an agency of the Federal Government is included in the term 'public' as used in the last sentence of 6111.05 of the Revised Code, which provides as follows:

"'The board may make copies of such records, but if such records pertain to a private disposal system, such copies may not be made available to the public without express permission of the owner.

"You are of course entitled to your opinion with regard to this matter but as has been stated previously we must disagree. The obvious intent and purpose of this provision of law is to make such records confidential for the exclusive use of the Ohio Water Pollution Control Board and its authorized representatives in the administration and enforcement of Ohio's Water Pollution Control Law (Sections 6111.01 to 6111.08, inclusive, of the Revised Code).

"In good conscience I could not suggest that any such records be released to the Federal Government or any other agency of government in view of the very serious consequences which could ensue as a result of such action. Section 6111.07 of the Revised Code provides in pertinent part as follows:

"'(A) No person shall violate or fail to perform any duty imposed by, sections 6111.01 to 6111.08, inclusive, of the Revised Code, or violate any order of the Water Pollution Control Board promulgated pursuant to such section.'

"Section 6111.99 of the Revised Code provides in pertinent part as follows:

"'(A) Whoever violates division (A) of section 6111.07 of the Revised Code shall be fined not more than $500 or imprisoned not more than one year, or both.'

"A review of the foregoing section readily shows that any person releasing such information would be subject to prosecution for the commission of a crime with a possible fine of $500 and imprisonment for one year. The persistent requests of representatives of your department to employees of this department to release any such records which we may have is tantamount, in my opinion, to requesting the commission of a crime, albeit unwittingly.

"In your letter you request that the Ohio Water Pollution Control Board obtain permission for a review of effluent data by your representatives of specified industries in the Warren-Youngstown, Ohio area. Since it is your department which is interested in reviewing any records we may have in this regard, may I suggest that you obtain permission from the owners of these companies. Upon presentation of proper authorization from the owners of these companies we will be most happy to make any and all records in our possession pertaining to such companies available to you for inspection and review."

CHAIRMAN STEIN: I would like to read the pertinent section of the law as I have it from the record and I -- to my best knowledge and belief, this is correct, this deals with the Ohio Board -- may make copies of such record. "That if such records pertain to a private disposal system, such copies may not be made available to the public without express permission of the owner."

I think the law is as I stated, this doesn't necessarily make this necessarily confidential between the Board and the owner. I think in your letter you have pointed out that we had to go to the industry and ask for their permission before you could make this available; is that correct?

MR. COMPSON: This information, as far as our department is concerned, is confidential information and, furthermore, I think it might be observed that it is the prerogative of our department and counsel for our department, the attorney general's office, to make a determination as to the applicability of Ohio law; and the provision of the Ohio law is perfectly clear to us and we cannot divulge this information.

CHAIRMAN STEIN: Sir, I again am quoting from your letter and I think the provision of the law may be clear and your letter abundantly clear. You say, and I quote from your letter, sir, signed by George Compson, Chief, Division of Legal Services, to Mr. Poston which you referred to before.

"In your letter you request that the Ohio Water Pollution Control Board obtain permission for review of effluent data by your representatives of specified industries in the Warren-Youngstown, Ohio area. Since it is your department which is interested in reviewing any records we may have in this regard, may I suggest that you obtain permission from the owners of these companies."

Now, here we go -- "Upon presentation of proper authorization from the owners of these companies we will be most happy to make any and all records in our possession pertaining to such companies available to you for inspection and review."

It seems to me your letter is abundantly clear. Are there any further comments or questions?

MR. POSTON: I wondered if it is possible, Mr. Doolittle, for other companies to indicate, other companies whom you made this presentation on behalf of, to indicate whether they are of the same opinion as Youngstown

Sheet and Tube that they would not give this information?

MR. DOOLITTLE: Mr. Poston, the other companies asked me to make the presentation concerning the programs and problems. They have not authorized me to commit the companies with respect to the question you asked.

MR. POSTON: But I noted several of the companies' representatives here and I wondered whether they would care to say anything with respect to this. If not, I have another question here that came to mind and that is that there is dredging going on in the river, dredging to remove flue scale from the river, and I am interested with the new abatement program which would be completed by '66 of this year.

Will this practice be unnecessary after this time? Will it be unnecessary to dredge the flue scale from the iron ore --

MR. DOOLITTLE: I doubt that I am qualified to answer that, Mr. Poston. The dredging, as I know, is a dredging of material which has accumulated in certain sections of the river as the result of these untreated discharges that I described, years ago. This has been going on for years and years, and there have been some substantial amounts deposited on the bed in these earlier years. I don't know who all is doing the dredging.

I know our company is having some done and it is for the purpose of recovering the iron contents.

Now, I have no idea how long it will take to do this. It would seem to me, however, from the schedule that I have outlined to you, that with these discharges of flue dust and mill scale cut down to the point where in another year they are practically nil, there would hardly be any need for dredging, certainly, of any future deposits because there wouldn't be any.

CHAIRMAN STEIN: Off the record.

(Discussion off the record.)

MR. POSTON: One other question. You spoke of a number of steel mills that do not have treatment works and that it is the intent to shut them down in the near future. And with this in mind, it was preferred not to provide any treatment of wastes from these particular mills.

Is there any definite closing date for these particular plants?

MR. DOOLITTLE: This is not our particular company and I will say very little about it, and anything I say is what I have been told by the other companies. The comment was not directed to all of the various waste discharges that I discussed. It was directed only to the matter of steel pits for collection of mill scale and oil, and it is my understanding that there are, in this valley, certain very old plants with very old mills, some of the kinds I have described before, have small pits. It is economically prohibitive to deal with these pits for these particular mills in the way they have been dealt with elsewhere. And the decision that faces the company that has these particular pits is that if they were forced to treat with respect to those pits, it would be economically impossible for them to continue the operation or they would close it down.

MR. POSTON: One other question. What is the plan or what will become of the ferrous iron that you talked of?

MR. DOOLITTLE: Well, I see you are catching me on the statement I said that there wouldn't be any flue dust coming down. That, perhaps, was an overstatment because I had said earlier that 19 percent of the pits would not be what the Ohio authorities have called adequate treatment, which means removal of substantially all of the flue dust. This does not mean, sir, that they are not now removing any of the flue dust. They are removing flue dust but they are not doing a particularly good job of it and, presumably, if the mills continue to operate, that small amount would still continue to be discharged.

CHAIRMAN STEIN: Are there any further

statements or comments? If not, I think Dr. Arnold would like to go ahead.

I have one further statement I would like to make, but are you people going to be here until the end? I think we might save that because we want to expedite some of these people getting out who have appointments. Dr. Arnold.

DR. ARNOLD: Thank you, Mr. Stein. If the remaining participants for Ohio will agree with me to yield a little of our time at this time, to first of all ORSANCO and later to Dr. Wilbar of Pennsylvania. Each of these gentlemen have commitments and responsibilities that cannot be delayed and each of them must depart very shortly, and we yield to ORSANCO for their presentation.

CHAIRMAN STEIN: You are just taking them out of order. Every one will have full time and be heard. This is just yielding the position on the program.

MR. CLEARY: Mr. Chairman, the Commission of the Ohio River Valley Sanitation Commission delegated Chairman Barton A. Holl to make a statement. I believe he is prepared now to make that on behalf of ORSANCO.

MR. HOLL: Mr. Chairman, conferees, ladies and gentlemen. My name is Barton Holl. I am chairman of the Ohio River Valley Water Sanitation Commission, and I make my statement in behalf of that agency. However, the record might also note that I am a member of the State of Ohio Water Pollution Control Board and have served on the Board since its establishment in 1951.

As a matter of background may I recall for you that 16 years ago eight states in the Ohio Valley not only recognized the problems associated with interstate water pollution, but created a unique regional agency to do something about it. With approval of the Congress of the United States these states drafted a compact wherein they pledged their resources and their police powers to coordinate efforts in a crusade for clean streams.

This compact established the Ohio River Valley Water Sanitation Commission, sometimes known as ORSANCO. The Commission is made up of three representatives from each state appointed by the governor of the state, and three representatives of the United States appointed by the President. These 27 commissioners promulgate regulations for interstate pollution control. If a state signatory to the compact is unable to secure compliance with these regulations, the Commission is authorized to intervene and bring about enforcement.

What I wish to emphasize is that these states did not wait on the Federal Government to discover that interstate pollution existed. Nor did they stand by for Federal funds or instructions before taking steps to curb pollution. Rolling up their sleeves and bending their backs to this task of river cleanup, these states secured compliance with pollution control measures from 1328 communities and 1552 industries throughout the Ohio Valley.

The record compiled during the past 16 years bears witness to outstanding progress in the control of water pollution in the Ohio Valley. This is not to imply, however, that the commissioners of ORSANCO and the states they represent are under any delusions that the job is completed. They simply assert that thus far about 90 percent of the toughest part of the program has been successfully dealt with.

Why was conference called.

The reason I preface my remark in this fashion is because the Commissioners of ORSANCO are sorely puzzled why this conference was called. It could hardly have been motivated by any evidence of lack of action in control of pollution on the Mahoning -- you have heard the record with respect to accomplishments. Nor could it have stemmed from a presumed lack of interstate enforcement authority or reluctance to use it.

Neither can we conceive that this conference was called by the Federal authorities simply for the purpose of securing information. Items set forth for consideration at the conference -- occurrence of pollution, adequacy of abatement measures, the nature of delays, if any, in securing compliance, and schedules of performance -- are documented in the public minutes, records and reports of ORSANCO. Furthermore, the Secretary of Health, Education, and Welfare has always had a representative -- in the person, no less, than the Surgeon General of the Public Health Service -- serving as a member of the Commission. We find it difficult indeed to understand why this well established channel of communication and coordination is being bypassed.

I feel compelled to point out these things in order to dispel any doubts about the ORSANCO states not cooperating with the Federal Government. What concerns us -- and must concern the citizens of the Mahoning Valley -- is the question of whether the Federal pollution control authorities are constructively cooperating with us.

I am not reassured in this respect after reading the HEW report on the Mahoning, which was handed to me a few days ago. It hardly represents to me an appropriate appraisal of the situation. In fact, it falls far short of what I would expect to receive from an agency having such competent scientists and engineers on its staff as does the Public Health Service.

Among other things, I am led to assume that this report was hastily contrived and that not all of the facts were adequately weighed. If this is indeed the case then the Department of Health, Education, and Welfare not only has done a disservice to itself but to all of us who are identified with the Mahoning Valley cleanup program. Incidentally, I am one of those who have been working on this program for more than a decade. Quite frankly, therefore, I am dubious about the sweeping conclusions in a report that seems to have been based largely on a quickie survey.

Incidentally, this seems to be an appropriate place for me to request that the record be clarified with respect to a statement appearing on page 2 of the HEW report. Here it is stated that "attempts to obtain data on industrial wastes from the Ohio Department of Health, ORSANCO and the plants themselves were unsuccessful." Speaking for ORSANCO, I wish the record to show that ORSANCO not only complied with all requests for data from the Public Health Service when it was scurrying around to compile the Mahoning report, but, in fact, has for years been routinely providing all kinds of data whenever it became available because the Public Health Service holds membership on the Ohio River Valley Water Sanitation Commission.

The Mahoning River Cleanup.

Earlier I mentioned that when the states created ORSANCO they clothed the Commission with enforcement powers should occasions arise when a signatory state needed help in securing compliance from a municipality or industry.

The State of Ohio was hampered in expediting action in Youngstown for the construction of sewage-treatment facilities.

I might digress from my report for a minute to say that I am very glad to hear Mayor Flask being an advocate of the elimination of pollution. He is not always in that boat. In fact, earlier he resisted us. He is like a man when he quits drinking; when he quits he wants everyone else to quit.

First there were problems associated with financing, then there was a taxpayer's suit testing constitutionality of ordinances.

Those familiar with the administration of pollution control will recognize that there is nothing novel about such a course of events. What should be mentioned, however, is that Ohio not only employed its legal powers to expedite compliance, but when local court action appeared to threaten delay, the state prepared to call upon the interstate agency to intervene. In this fashion Ohio gave further evidence of intent to speed the removal of obstacles in completing the Mahoning program. At the request of Ohio, the commissioners of ORSANCO agreed unanimously to intervene. Thereupon the Ohio Water Pollution Control Board informed Youngstown of its intention to employ interstate compact enforcement measures. Before ORSANCO started proceedings

Youngstown made an agreement with the state board on a compliance schedule. Youngstown has honored this agreement and the treatment plant is now in operation.

While the incidents outlined with respect to the City of Youngstown were taking place, the State of Ohio was not idle in prompting compliance with other components of its pollution-abatement program for the Mahoning River. The required remedial measures were detailed in a report the Department of Health issued in October 1954 based on a two-year investigation of sources of pollution.

One matter in connection with development of this report is pertinent to the deliberations at this conference. As far back as 1952 representatives of the Federal Department of Health, Education, and Welfare had been invited by Ohio to assist in the conduct of field surveys, in the evaluation of data, and in the determination of treatment requirements. This collaboration was based on the desire of Ohio to cooperate fully with the spirit and intent of the Federal Water Pollution Control Act.

Among other things, this Act directed the Surgeon General of the Public Health Service to prepare comprehensive programs for reducing pollution of interstate waters. In so doing the Surgeon General was authorized to make joint investigations with state agencies in developing such programs. It was the hope of the State of Ohio that by working jointly with the Public Health Service on the Mahoning program this would avoid duplication of effort and expedite its acceptance by all parties concerned. This, in fact, was achieved because when the report was issued it contained the statement that: "The Surgeon General, Public Health Service, has reviewed this report and has determined that it meets his requirements for a comprehensive program."

Since 1954 the status reports to ORSANCO made by the State of Ohio have revealed consistent progress toward attainment of the aims that were blueprinted. Not the least of these aims was securing installation of sewage-treatment facilities by all municipalities. Completion of the Youngstown facilities this summer will represent full achievement on reaching this goal.

Summary in brief.

In conclusion, I wish to emphasize these points:

1. In so far as interstate pollution control is concerned, the commissioners of ORSANCO regard progress on the Mahoning as evidence of conscientious and effective compliance of the State of Ohio with the obligations assumed as a signatory to the Ohio River Valley Water Sanitation Compact.

2. The Commonwealth of Pennsylvania, a signatory to the compact and the state was most intimately concerned with pollution originating in Ohio, has not registered

dissatisfaction at meetings of the compact commission with progress being made by Ohio. Quite to the contrary, the view was expressed in 1962 (September 13, 1962) and again at a meeting of the Commission last month (January 14, 1965) that Pennsylvania had no reason to voice complaint with progress being made by Ohio in cleaning up the Mahoning.

3. Finally, the treatment requirements and water-quality goals established by the State of Ohio were developed in collaboration with the Public Health Service and received the endorsement of the Surgeon General of the Public Health Service as meeting interstate requirements under the Federal Water Pollution Control Act.

I respectfully urge that the conferees give cognizance to these considerations when they undertake the preparation of conclusions emanating from this conference.

Now, Mr. Chairman, as you might judge earlier, I felt this conference was not necessary. As I sat here this morning and again this afternoon and listened to the story being told, I want to change my mind. I think probably I want to state that I am glad this conference is being held because it has given the industries and the municipalities in the State of Ohio a chance to tell a story, a story of accomplishment that we might not have been able to hear effectively if this conference had not been called.

So I think much good has been accomplished and I am proud to have been a member of the Water Pollution Board of Ohio and a member of ORSANCO.

Now, Mr. Chairman, this concludes the ORSANCO statement for the time being. After I have heard other presentations at this conference, I may wish to make further comments or call upon the ORSANCO staff for a statement.

CHAIRMAN STEIN: Thank you, sir.

... Applause ...

CHAIRMAN STEIN: I would like to make one comment because this has come up before. We do have a member of the President's Water Pollution Control Advisory Board here; Mr. Haik.

You raised a point which was raised this morning and I would like to give the position, at least as we see it, from the Federal level, on our relations with ORSANCO.

Sir, we do not believe that the Public Health Service is entitled to representation or ORSANCO have a representative or ORSANCO per se. The compact provides that there are to be three Federal members. One of those Federal members happens to be the Surgeon General. He represents the Federal Government generally. He is not the Public Health Service or our Department delegate to ORSANCO.

The President, tomorrow, if he wished, can reappoint, continue the appointment, or change him and have someone else. As I think I have pointed out before, we had the same relationship with the Potomac Valley Commission. When a member of the Public Health Service was always the Federal representative, President Kennedy saw fit to terminate that and place a private attorney in representation. The President can do that not only with the Surgeon General but either of the other two Federal representatives at any time. These people represent the Federal Government generally and not us at ORSANCO, and I think for the people that have raised this question, I just want to put out the way we look at that problem.

MR. HOLL: We have been very happy with the representatives we have had. Upon assuming the Chairmanship, I criticized the Federal Health Service in their participation in ORSANCO because they did not take an active part in the discussion. I accused them of being the ears and eyes of whatever goes on and not taking part.

So the last meeting we had, we had full compliance and full discussion on the part of the Federal people, and for the first time since I have been a member of the Commission, they told us what they had in mind; wildlife, Army Engineers, Public Health Service, and they told us what they had in mind.

CHAIRMAN STEIN: Now, I think on your second point, sir, on the question of asking ORSANCO for information: Our investigators, I think, we will have to wait until our investigators give their report. The representatives of ORSANCO will be here and we will spotlight that question. I think, if we got into this now, we may have difficulty in trying to keep with the schedule.

A very brief other remark on the reason the conference was called. As far as I know, the conference was called, again, because of the statutory requirements. Evidently the Secretary believed pollution in one state was endangering people in another, the health and welfare of the people in Pennsylvania. Again, I can appreciate your remark about Mayor Flask because I used to be in the restaurant sanitation business. When we cleaned out the dirtiest business restaurant in town, they would knock out the wall and invite everyone into their kitchen. This was the typical operation.

But I would like to indicate that the -- I have been in this business just as long as Mayor Flash has been a mayor or in politics. When I got into water pollution control, it was in 1948. But I do remember not too many years before I discovered what the score was, and that I would go to meeting after meeting and hear about these wonderful accomplishments that were done but find the rivers being dirtier and dirtier, and there are two aspects to this.

One is to have pictures of the plant and to have a description of all the progress being made, but the key point in pollution control is what's happening to the river.

Now, I suggest that our Federal report generally deals with what's happening to the river, and when that report is made, we can make a judgment why the conference was called and why it should have been, or maybe it shouldn't have.

MR. HOLL: Mr. Chairman, I will make one further comment that I did not intend to make when I came here today. But my concern is, and I have tried to over a period of 20 years, contribute something to the clean stream program. Last week, when I was in Columbus, I read a Columbus paper, a big headline across, the story that the Public Works Committee in Washington is going to view a motion picture film, 20 minutes in length, showing the pollution along the Ohio River.

It said the Ohio River was the most overworked river in the Nation. I immediately called ORSANCO about that statement because I was concerned about it. I didn't believe it was true and I resented it with all of my might, and I was informed by ORSANCO that representatives of the Muskee committee, that's the committee in the Senate that was hearing the legislation on pollution, have sent representatives of that committee to photograph all instances of pollution, open sewers, either industrial or municipal on the Ohio River, and they got to Cincinnati and they got into the Army Engineers' office and were asked then what's being done and they said, "You are not going to talk about the Ohio River without visiting ORSANCO."

They said, "We are not interested in talking to ORSANCO, we are not interested in any progress that has been made."

Now, I understand people who have seen that film claim that it is not a fair representation of what the situation is. That's the thing I am indignant about. I want to cooperate with the agencies that are interested, sincere, and want to do a job, and we say it and we admitted it, the job is not done; probably will never be done. It's like building roads, the population expands and industries grow. We are going to have to be more and more watchful. But let's go into this thing with the purpose of cooperating and let's not be pointing fingers at people who are trying to do the job.

Thank you.

CHAIRMAN STEIN: You know that the Public Works Committee in the Senate, the legislative, is completely different from us. But in deference to them, if this is the film I think you are talking about, as far as I know, they just didn't come to Ohio for that. Because, at the time they were making that film, I happened to be in Alaska. I happen to know these fellows -- I know them from

Washington - and I know they also took films in Alaska.

Now, I understand they went all around the country. This wasn't only ORSANCO. I would like to point out to you, Mr. Holl, and I think the rest of the group here, I have repeatedly answered questions this way, frequent questions about what is the worst river you have ever seen. I don't think you can compare them. We have never put them up. Each river is a problem unto itself. We have a phrase of law which means on its merits, and unless you consider the river on its own merits, you are not dealing with a problem.

I don't think that any statement ever emanated from -- at least the Water Pollution Control Program or the Executive Department - a comparison of what river was worse than any other river.

MR. HOLL: I am not identifying you with that motion picture. But this is one of the things that gets a businessman kind of worked up about things.

MR. POSTON: I would like to make one brief comment to Mr. Holl to the effect that I am very happy to see that he is getting something out of this meeting and something worthwhile in the telling about activities that are going on. I have been involved in some five or six of these, and my observation is that there are many of them just about like this but this is a little more spicy, a little lively.

I think there have been accomplishments in all of these and I truthfully trust that much will come out of this.

CHAIRMAN STEIN: Let's have a five-minute break.

(Recess had.)

CHAIRMAN STEIN: May we reconvene, please? I wonder if you people in the rear would try to be seated so we can reconvene.

Dr. Wilbar.

DR. WILBAR: Thank you, Mr. Chairman, members of the conference. Pennsylvania has about five percent of the Mahoning Valley in it and so we won't need so much time as Ohio, perhaps five percent or a little more than five percent of the time used by Ohio in this matter.

The call to this conference by Secretary Celebrezze said it would be held today and I am afraid I personally took this literally because I have a meeting of the Pennsylvania Sanitary Water Board, of which I am Chairman, tomorrow, and there is a hearing on the committees of our legislature tomorrow of which I must appear so I will have to leave this evening. But in my stead, we will have Mr. Richard Boardman, who is Chief of the Water Quality Section in the Pennsylvania Department of Health. I would like Mr. Boardman to stand so you can see him and he will be with the conference and represent Pennsylvania after today.

I also have with me and for the question and discussion period, Mr. Walter Lyon who is the Director of our Division of Sanitary Engineering and Mr. William Gross who is the Counsel for the Sanitary Water Board. We did not have enough copies of our reproduced report for everyone, but if those who wish copies and haven't received them will contact Mr. Boardman or send any of us a request in the mail, we will see that you receive copies.

Now, Secretary Celebrezze's conference call indicated that the subject of this conference would be the interstate pollution of the Mahoning River and I feel that we must stick to that because that is what the conference was called about. I have read the report of the Public Health Service. Of course, it may or may not be submitted the way it was reproduced and sent out, but I would say that we should not argue because of the way the conference was called and we are not prepared to discuss individual waste sources in Pennsylvania on the Shenango River or waste sources on the Beaver River or alleged interstate pollution on the banks of the Shenango River or alleged interstate pollution on the Shenango River. Since this material is not in any way pertinent to the question before this conference, it seems appropriate at this time to request that all this material, should it be brought up, be stricken from the record. We rely on the water users of the Shenango River.

That water quality of the Shenango River before its confluence with the water quality of the Beaver River may have to be considered. I do not wish to imply that all persons who are interested and concerned with waste sources on the Shenango or the Beaver are not free to obtain this from the Pennsylvania Sanitary Water Board.

This information is available to the Public Health Service and to anyone else who has a legitimate interest in this information. This information does not appear to be a pertinent part of the subject of this conference and does not have anything to do with the pollution which may flow from Ohio to Pennsylvania by the Mahoning River.

We in Pennsylvania have a keen interest in the quality of the water in the Mahoning River, although only about 12 miles of its length lies within Pennsylvania. The quality of the water in the Mahoning has a definite influence on the quality of the water in the Beaver River which is used intensively as a source of industrial and public water supply.

As Chairman of the Sanitary Water Board of Pennsylvania, I have been requested by that Board to present to this conference official facts and opinions of our commonwealth concerning pollution of the Mahoning River basin and steps which will be taken and should be taken for abatement of such pollution.

It is essential that the water quality in Pennsylvania's streams be maintained at the highest level possible. There is an ever increasing demand for water of good quality to meet the health, social and economic needs of our populace. We must be assured that this need is met.

As Pennsylvania's water pollution control agency, the Sanitary Water Board has since its inception in 1923 been striving assiduously to assure that Pennsylvania's streams meet the quality requirements of all water users. The basis of this program has been the requirement that all water users return water to the streams in a condition which does not adversely affect present and potential water users.

While working to protect water quality for water users in Pennsylvania we have also recognized our responsibility to protect the quality of interstate streams. We have been an active signatory state in the Ohio River Valley Water Sanitation Commission since its creation in 1948. We have cooperated fully with neighboring states in correcting and preventing interstate pollution. We have worked closely with the staff of the U.S. Public Health Service in connection with the performance of its responsibilities under the Federal Water Pollution Control Act.

The Secretary of Health, Education, and Welfare has authority under Section 8 of the Federal Water Pollution Control Act to call a conference such as this when on the basis of reports, surveys or studies he has reason to believe that there is pollution endangering the health or welfare of persons in a state other than that in which the discharge is occurring. I am sure, however, that all parties concerned realize that the Act clearly places primary responsibility for preventing and controlling water pollution with the state and interstate agencies as distinguished from the Secretary of Health, Education, and Welfare or his designee.

It should also be pointed out that the interstate compact on the Ohio River basin was officially sanctioned by the Congress of the United States and the legislatures of the States of Ohio and Pennsylvania. The Federal Government and the States of Ohio and Pennsylvania are represented on the Commission. Any of the parties involved may bring up before the Commission interstate pollution problems and have frequently done so in the past. Neither the Federal Government nor the two States involved have up to now requested specific action regarding the Mahoning River.

We are willing to discuss the problem of pollution of the Mahoning River with representatives of the State of Ohio, the Ohio River Valley Water Sanitation Commission, and the Federal Government. To supplement this official presentation, the Sanitary Water Board has also invited representatives of the Pennsylvania Section of the American Water Works Association, the Pennsylvania Federation of Sportsmen's

Clubs, the Pennsylvania Division of the Izaak Walton League, and the City of New Castle to make statements.

I shall introduce these spokesmen later but at this time I will briefly describe Pennsylvania's Water Pollution Control program, summarize water quality in the Mahoning River and its effects on various uses in Pennsylvania, and outline what Pennsylvania is doing and has been doing to improve water quality in the Mahoning River basin.

II. Pennsylvania's Portion of the Basin.

Physical Description. The Mahoning River originates in eastern Ohio and flows into western Pennsylvania, joining the Shenango River to form the Beaver River. The drainage area of the Mahoning River is 1100 square miles, 54 square miles, or about five percent, of which lie in Pennsylvania. The Mahoning River basin constitutes about one-third of the area of the Beaver River basin.

The Pennsylvania portion of the Mahoning River lies entirely within Lawrence County. The largest population centers in the Pennsylvania portion of the basin are Bessemer Borough (approximately 1500 persons) and the unincorporated villages of Hillsville and Edenburg. The City of New Castle lies in the Shenango River basin immediately upstream from the confluence of the Shenango and Mahoning Rivers. Some urban development on the outskirts of New Castle extends into the Mahoning basin.

The topography of the Mahoning River basin is characterized by rolling hills and broad stream valleys. The broad stream valleys of the Shenango, Mahoning and Beaver Rivers form natural passageways for the flow of traffic between Lake Erie and Pittsburgh industrial complex. Major highways and rail lines follow these river valleys.

The Mahoning River basin is underlain by deposits of clay, limestone, sandstones, natural gas, oil and coal. Limestone deposits have been mined extensively and are probably the most important mineral resource of the basin. Although coal seams underlie the basin, variability in quality and size of the coal deposits has limited their development. Coal mining is not a major industry in the basin. Some farming is practiced, but most of the residents of the basin are employed in the industrial complexes centered in and around New Castle and Youngstown.

Stream Flows.

Stream flow in the Mahoning River is regulated to some extent by a network of reservoirs in Ohio. The average flow at Lowellville, Ohio gauge (near the

Pennsylvania-Ohio State line) is approximately 1100 cubic feet per second.

Water Use.

Little or no use is made of the Mahoning River in Pennsylvania. The Beaver River is used extensively as a source of municipal and industrial water supply. Two water treatment plants (both operated by the Beaver Falls Municipal Authority) use the Beaver River as a source of raw water. The two plants are located in the lower reaches of the Beaver River. One is located immediately upstream and one immediately downstream from the Borough of Beaver Falls. The plants serve 11 municipalities with a combined population of about 75,000 people. The Beaver River is used extensively as a source of industrial water supply, most of which is used for cooling purposes. Relatively small quantities of water are used as boiler feed water or for manufacturing processes. Major industrial water users include: Republic Steel Company at Beaver Falls, Moltrup Steel Company at Beaver Falls, Townsend Company at Fallston, and B. and W. Tubular at West Mayfield and Pennsylvania Power Company at West Pittsburgh. The total average daily water usage by these industrial establishments is over 300 million gallons.

Now as to Pennsylvania's water pollution control program, water pollution control legislation:

The first step to control water pollution in Pennsylvania was taken in 1905 when the legislature passed the "Purity of Waters Act." This act prohibited the discharge of sewage waters of the commonwealth unless it was the unanimous opinion of the Governor, Attorney General, and Commissioner of Health that the discharge would not create a public health hazard. After the Sanitary Water Board was created in 1923, the powers formerly vested in the Governor, Attorney General and Commissioner of Health by the "Purity of Waters Act" were transferred to the Board.

The second law dealing with stream pollution was passed in 1937. This legislation is commonly referred to as Pennsylvania's Clean Streams Law. This law supplemented and strengthened the authority of the Sanitary Water Board in its administration of the commonwealth's stream pollution control program. It added provisions for the control of pollution from industrial wastes in addition to pollution from sewage. It did, however, exclude from control acid drainage from mines and silt from coal preparation plants until such time as in the opinion of the Sanitary Water Board practical means for the removal of the pollutional properties of such waters had become known.

In 1945 the Clean Streams Act was amended to give the Sanitary Water Board jurisdiction over acid mine drainage discharged to or effecting clean waters of the commonwealth, and removed from the law the exemption previously granted for discharges of silt from coal preparation plants.

The Pennsylvania Sanitary Water Board, an administrative board within the Department of Health, was the first state agency of its type to have the responsibility for a state's pollution control activities. It introduced the concept of having on one Board representation from major interest groups concerned with water polltuion control. The Board is made up of three public members and representatives of five major state agencies -- the Department of Health, the Department of Mines and Mineral Industries, the Department of Forests and Waters, the Department of Commerce, and the Fish Commission. The Secretary of Health is Chairman of the Board.

The Board carries out active programs to control pollution from sewage, industrial waste and mine drainage.

As to sewage, the Sanitary Water Board has the power to order a municipality or person to abate the discharge of sewage that causes pollution.

To determine if a municipality or person should receive an order, the Department of Health makes a study of the case and presents its findings to the Board. A public hearing is held and interested parties are given an opportunity to hear the evidence presented by the Department of Health and to present information that they feel is pertinent. All evidence is considered by the Board and an order is issued if the Board finds that sewage is being discharged from a sewer system owned and maintained by the municipality or person and that the discharge of this sewage "is or may become inimical or injurious to the public health, animal or aquatic life, or the use of the receiving waters for domestic, industrial, or recreational uses."

If orders are not complied with, the Board takes appropriate legal action to obtain compliance. The powers of the Board in this regard have been reaffirmed in a number of recent court decisions.

Now as to industrial waste, the Clean Streams Law prohibits the discharge of industrial wastes unless a permit for the discharge has been issued by the Sanitary Water Board. The Board may not approve discharges that will cause pollution. Industrial plants that were discharging wastes prior to 1937 must abate or provide treatment when so ordered by the Board. Because the Clean Streams Law made it unlawful to begin to discharge wastes without a permit from the Board, orders are not necessary for discharges that have begun since 1937.

Mine Drainage. The mine drainage control program began with the 1945 amendment to the Clean Streams Law which made it illegal to open a new mine or to reopen or continue an existing mine operation without securing approval of a plan of drainage from the Sanitary Water Board. To carry out this program, the Board developed a permit system for regulating both deep and strip mining.

The field inspection program. In addition to the Board's permit system for controlling pollution, an active field inspection program is acrried out to insure that permit requirements, Sanitary Board Rules and Regulations and provisions of the Clean Streams Law are being met. When violations are detected, the responsible individual is given a reasonable time to correct the violation. When violations are not corrected within the time specified by the Sanitary Water Board, legal action is taken to secure compliance.

Stream Classification. The basis for the Sanitary Water Board's sewage and industrial wastes control program is a state-wide system of stream classifications.

In 1944 the Sanitary Water Board conducted a series of 10 hearings at various places throughout the state concerning classification recommendations made by its staff. Due notice was given to municipal and industrial representatives of the place and time of the hearings. The Chairman of the Board explained in detail the purposes and plans for the state-wide pollution control program. An opportunity was afforded those present to express their views on the subject, either orally at the hearings or in the form of a brief. The Board held classification hearings for the Mahoning River basin in Pittsburgh on June 20, 1944.

Following these hearings, the Board considered the testimony and classified the streams as to the degree of treatment that would be required for sewage and sewagelike industrial wastes. The Board has also established minimun treatment requirements for other industrial wastes.

Changes in stream quality and waste loads have made it necessary in recent years to conduct reclassification studies in a number of watersheds throughout the state.

The Mahoning River throughout its length in Pennsylvania is classified as astream on which "primary" treatment is required. Primary treatment is defined by the Board as follows:

> "Primary treatment of sewage is such treatment as, in the opinion of the Board, will remove practically all the settable solids; will remove at least 35 percent of the organic pollution load as measured by the biochemical oxygen demand test; will provide effective disinfection to control disease-producting germs; will provide satisfactory disposal of sludge; and will produce a final effluent that is suitable for discharge into the receiving stream."

The tributaries of the Mahoning River in Pennsylvania were classified by the Board as requiring "complete" treatment. Complete treatment is defined by the Board as follows:

> "Complete treatment of sewage is such treatment as, in the opinion of the Board, will remove practically all of the suspended solids; will remove at least 85 percent of the organic pollution load as measured by the biochemical oxygen demand test; will provide effective disinfection to control disease-producing germs; will provide satisfactory disposal of sludge; and will produce a final effluent that is suitable for discharge into the receiving stream."

In addition to the above, primary and complete treatment must include the removal of "oils, greases, acids, alkalis, toxic, putrescible, taste-and-odor producing substances and other substances inimical to the public interest in the receiving stream.

Field work has been completed and a draft report written in connection with a study of the Beaver River and its tributaries to determine if reclassification of the streams is necessary. Sampling for this study was begun in 1959. After a thorough review of the data collected is completed, a report will be submitted to the Board with recommendations on necessary changes in the present treatment requirements. We expect to have this report completed this spring.

The review of stream classifications is a continuous program in Pennsylvania assuring that treatment requirements are tailored to meet the needs of changing water uses, population and waste discharges.

ORSANCO Requirements. Pennsylvania, as a member of ORSANCO, has agreed to the ORSANCO recommendations for sewage and industrial waste treatment in the Ohio River basin. The Sanitary Water Board's present treatment requirements for the Mahoning basin meet the ORSANCO recommendations.

Pollution control progress. First on Sewerage.

No untreated sewage from communities in the Pennsylvania portion is being discharged to streams in the Mahoning basin.

Three sewage treatment plants discharge treated effluent to streams in the basin. The locations of the sewage treatment plants are indicated on the map on page 57 of the Appendix. The largest plant is a primary degree treatment plant serving the City of New Castle. The New Castle plant discharges to the Mahoning River about one-half mile upstream from its mouth. The plant presently serves 55,000 persons. The design population is 60,000. The Sanitary Water Board recently granted a permit to the City of New Castle's sewerage authority approving plans to enlarge and improve the treatment efficiency of the existing plant. The plant has been designed to provide intermediate degree treatment for a 1980 population of 90,000. Intermediate degree treatment in this case has the same requirements as complete treatment except that the B.O.D. removal requirement is 65 percent. Because the design of the plant provides for complete treatment of sewage from approximately 45,000 persons, the plant will be capable of providing treatment approaching complete treatment for a number of years. As the waste loads increase the efficiency will decrease to a minimum of 65 percent B.O.D. removal at the design population of 90,000.

The city has accepted a Federal Water Pollution Control Act grant to partially cover the cost of the new facilities. We expect construction to begin in the near future since the city has already advertised for bids for the project.

The other two plants are small package type treatment plants which provide complete treatment. The larger of the two plants serves the Mohawk Area Jr.-Sr. High School. It was designed to serve 1500 students and presently serves 1200. It discharges to an unnamed tributary of Hickory Run.

The other plant serves the Villa Maria School. It is presently serving its design population of 300 persons and discharges to an unnamed tributary of Coffee Run.

All of the sewerage facilities in the Mahoning basin are presently in compliance with Sanitary Water Board Requirements.

Now as to industrial waste. Four industrial establishments in the Mahoning River basin have waste treatment facilities and have Sanitary Water Board permits to discharge treated waste water to the waters of the commonwealth. Only one of the plants presently has a waste discharge. Two plants operate closed systems. The Robinson Industrial Waste Company has not operated for several years. The industrial establishments are listed in Table 1. Their locations are shown on page 57 of the Apprendix.

Table 1

INDUSTRIAL WASTE TREATMENT PLANTS
MAHONING RIVER BASIN

Name	Location	Type Waste	Treatment
1. Robinson Industrial Waste Co. *	Bessemer	Waste Pickle Liquor	Neutralization Sedimentation
2. Carbon Limestone Co. **	Mahoning Twp.	Limestone Wash water	Sedimentation
3. Vanport Stone Inc. **	Mahoning Twp.	Sand and Gravel Wash Water	Sedimentation
4. American Cynamid Co.	North Beaver Twp.	Acid waste	Neutralization Sedimentation

* Presently not operating

** Presently operated with closed systems.

All of the industrial establishments in the basin are in compliance with Sanitary Water Board requirements.

As to mine drainage. The Mahoning River basin lies on the western edge of Pennsylvania's main bituminous coal filed. In general, the cola beds are thin and as a result have not been developed extensively. Mine drainage resulting from the limited mining carried out in the basin has not had a significant effect on water quality in the streams of the basin.

Water Quality. Beaver River Basin Survey Data (1959-1960)

Department of Health staff conducted a two-year water quality survey on the Beaver River basin, from September 1959 through September 1961. Twenty-six sample for chemical analysis were collected at each sampling point in the basin. Chemical analyses performed in the Department's chemical laboratory in Harrisburg included pH, alkalinity, hardness, chloride, sulfate, total and suspended solids, aluminum, iron, manganese, and B.O.D. field analyses included dissolved oxygen and temperature. In addition to the chemical and field analyses, a total of 26 coliform determinations were made for each sampling station. The results of these analyses are tabulated in Tables 8 through 33 and Table 37 in the Appendix

The sampling stations that have a direct bearing on water quality on the Mahoning River and its effects on the Beaver River are:

Station No. 1 - Located at Wampum on the Beaver River, approximately seven miles downstream from the confluence of the Shenango and Mahoning Rivers at the Pennsylvania Route 288 bridge.

Station No. 4 - Located on the Mahoning River, approximately 0.3 miles upstream from its confluence with the Shenango River at Pennsylvania Route 18 bridge.

Station No. 5 - Located on the Mahoning River, approximately 1.4 miles upstream from its confluence with the Shenango River at the Pennsylvania Route 108 bridge.

The locations of these stations are shown on the map on page 58 of the Appendix.

The results of the survey are summarized and discussed below. Unless otherwise indicated, all results are in milligrams per liter. Probability plots of selected parameters are included in the Appendix (Figures 1 through 4).

1. Iron and Manganese:

Table 2

IRON CONCENTRATION
Beaver River Survey - 1959-1961
(Results in mg/1)

Station Number	Mean	Median	3 Highest Values
1	1.9	1.0	8.4, 6.8, 6.8
4	3.4	1.2	20.0, 12.0, 10.0
5	3.6	2.0	16.0, 14.0, 12.0

Table 3

MANGANESE CONCENTRATION
Beaver River Survey - 1959-1961
(Results in mg/1

Station Number	Mean	Median	3 Highest Values
1	0.28	0.2	0.8, 0.8, 0.7
4	0.41	0.3	1.0, 1.0, 1.0
5	0.45	0.3	1.3, 1.0, 1.0

It can be seen from Tables 2 and 3 that water treatment works would be required to remove considerable quantities of iron and manganese to meet recommended drinking water limits. Of greater concern is the variability of the iron and manganese concentrations. Iron which settles on the stream bottom during low or or normal stream flows is flushed from the river bottom and carried downstream when the flows rise sharply. The three highest iron concentrations given above occurred during flushouts.

Bacterial Quality.

Table 4

COLIFORM DENSITIES
(Beaver River Survey - 1959-1961
(Most Probable Number per 100 ml)

Station Number	Mean	Median	Geometric Standard Deviation
1	900,000	84,000	8.9
4	614,000	130,000	5.1
5	566,000	7,800	18.8

These results illustrate the effect of the effleunt from the New Castle primary degree sewage treatment plant which is downstream from Station 5 and upstream from Station 4. The relatively constant rate of discharge from this plant tends to keep the coliform densities uniform at Station 4. The high value of the geometric standard deviation illustrates the variability of coliform densities above New Castle. This variability is probably due to variations in coliform die-off rates. During warm weather when coliform die-off is greatest, coliform densities were 10, 000 per 100 ml or less, but during winter when die-off rates are usually lower than in summer, and particularly during periods of high stream flows, the coliform concentrations were highest at Station 5. Because of these high coliform densities the Mahoning River is not suitable for public bathing nor is it desirable as a source of public water supply. However, we expect that the new Youngstown sewage treatment plant will result in a considerable reduction in these densities.

3. Biochemical Oxygen Demand and Dissolved Oxygen.

Table 5

BIOCHEMICAL OXYGEN DEMAND
Beaver River Survey - 1959-1961
(Results in mg/l)

Station Number	Mean
1	6.9
4	7.2
5	7.2

Table 6

DISSOLVED OXYGEN
Beaver River Survey - 1959-1961

Station Number	Mean (% Saturation)	Median (% Saturation)	Percent Time Sample Less Than 50% Saturation	Percent of Time D.O.was Less than 4 mg/1
1	59	51	46	27
4	49	42	62	62
5	49	42	66	62

The high B.O.D. of the Mahoning River has an adverse effect upon water quality. Although the dissolved oxygen concentration in this section is generally too low to support a normal aquatic population.

The major cause of depression of dissolved oxygen in the Mahoning River apparently is the result of wastes discharged in Ohio. The Youngstown sewage treatment plant will undoubtedly improve the B.O.D. and D.O. situation.

4. Other Parameters.

Both the Mahoning and Shenango Rivers were alkaline throughout the survey periods.

Phenolic substances were detected at all sampling stations during the surveys. Concentrations were highest at stations on the Mahoning River.

Recent Survey Data.

During the first two weeks of January 1965 three samples were collected at each of five sampling stations on the Mahoning River. These stations are designated as Stations 4, 5, 6, 7 and 8 on the sampling stations location map on page 58 of the Appendix. The results of analysis of these samples are tabulated in Tables 34 through 37 of the Appendix. These samples were collected during a period of higher than average flow following a period of low flow. They may reflect the effects of a flushout of sludge deposits which accumulated during periods of low flow.

The concentrations of iron, B.O.D.,and dissolved oxygen were compared to curves which illustrate the range of the values recorded during the two-year survey. The values recorded in 1965 are well above the median values of the two-year survey period, and concentrations of iron and B.O.D. were particularly high.

Effects of Mahoning River on water uses.

The waters of the Mahoning River in Pennsylvania have no known public use. It is difficult to judge whether this is primarily the result of stream water quality or whether it is the result of a combination of influences involving geography and geology.

As a major tributary of the Beaver River, the quality of the Mahoning has a definite effect on the quality of the Beaver River. Users of the water of the Beaver River are adversely affected by high iron and manganese concentrations, low dissolved oxygen concentrations, poor bacteriological quality and taste-and-odor-producing substances. Public water supplies report that taste and odor problems have diminished in recent years.

Pollution abatement plans.

The 1962 report by the State of Ohio presented to the Ohio River Valley Water Sanitation Commission, and the 1964 report recently issued, indicate that considerable progress is being made toward abating the remaining pollution problems in the Ohio portion of the Mahoning River. And I might add that we heard a great deal more about that today.

The only waste discharge having an effect on water quality in the Pennsylvania portion of the Mahoning basin is the discharge from the City of New Castle's primary degree sewage treatment plant which meets the Pennsylvania Sanitary Water Board's treatment standards. The increased treatment proposed by the city will even further improve water quality below the discharge. The New Castle authority has already advertised for binds on the treatment plant improvements.

Conclusions.

The Mahoning River is a relatively small stream burdened by heavy industrial and municipal use. The quality of the stream limits its usefulness. Reports by the State of Ohio indicate that much progress in pollution abatement is taking place there. Some improvement has already been noted in reduction of taste and odor problems. It is evident that in addition to water pollution abatement efforts, further water resource development is needed to assure the full range of beneficial uses of the Mahoning River.

APPENDIX

Table 7

Sampling Station

Descriptions

Station 1.	The Pennsylvania Route 288 bridge at Wampum on the Beaver River approximately seven miles downstream from the confluence of the Shenango and Mahoning Rivers. Sampling period September 1959 to September 1961.
Station 2.	The Baltimore and Ohio and Pittsburgh and Lake Erie Railroads bridge in New Castle on the Shenango River approximately 0.9 miles upstream from its confluence with the Mahoning River. Sampling period September 1959 to September 1961.
Station 3.	The LR37031 bridge upstream from New Castle on the Shenango River approximately 7.5 miles upstream from its confluence with the Mahoning River. Sampling period September 1959 to September 1961.
Station 4.	The Pennsylvania Route 18 bridge in New Castle on the Mahoning River approximately 0.3 miles upstream from its confluence with the Shenango River. Sampling period September 1959 to September 1961 January 1965.
Station 5.	The Pennsylvania Route 108 bridge in New Castle on the Mahoning River approximately 1.4 miles upstream from its confluence with the Shenango River. Sampling period September 1959 to September 1961 January 1965.
Station 6.	The Township Route 372 bridge at culverts on Mahoning River approximately 4.5 miles upstream from its confluence with the Shenango River. Sampling period January 1965.
Station 7.	The U.S. Route 224 bridge at Edinburg on the Mahoning River approximately 6.5 miles upstream from its confluence with the Shenango River. Sampling period January 1965
Station 8.	Township Route 324 bridge at Hillsville on Mahoning River approximately 9.5 miles upstream from its confluence with the Shenango River approximately 2.5 miles downstream from the Pennsylvania-Ohio state line. Sampling period January 1965.

Table 8

RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled September 15, 1959

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	clear	clear	clear	clear	clear
Color	25	25	25	30	25
Odor	faint musty	faint musty	faint musty	faint musty	faint musty
Turbidity	20	15	5	10	10
pH	7.4	7.3	7.1	7.2	7.2
Alkalinity	72	68	52	84	82
Acidity, Hot pH 8	0	0	0	0	0
Hardness	130	90	78	155	160
Chloride	13	7	7	17	15
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	68	38	42	88	88
Total Solids	250	160	160	300	310
Suspended Solids	20	20	25	15	20
Aluminum	0	0	0	0	0
Total Iron	0.5	0.6	1.6	0.5	0.5
Manganese	0	0	0	0	0
Phenol	0	0	0	0	0
B.O.D.	7.9	2.9	5.7	11.1	11.5
D.O.	5.9	sat.	8.0	5.0	4.9
D.O. % Sat.	67	--	86	57	55
Stream Temp. °C.	22	19	19	22	22

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light

sat. - saturated
% sat.- percent of saturation
°C. - degrees centigrade

Table 9
RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled September 23, 1959

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	v. sl. brown	v. sl. brown	v. sl. brown	v. sl. brown	v. sl. brown
Color	25	25	25	25	30
Odor	distinct musty	distinct musty	faint musty	faint musty	faint musty
Turbidity	15	20	20	15	20
pH	7.7	7.8	7.3	7.1	7.1
Alkalinity	72	61	46	76	84
Acidity, Hot pH 8	0	0	0	0	0
Hardness	140	92	76	175	155
Chloride	19	9	8	24	23
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	76	45	41	95	100
Total Solids	300	190	180	340	350
Suspended Solids	15	15	15	15	10
Aluminum	0.5	0.5	0	0.5	0
Total Iron	0.2	0.5	0.8	0.3	0.4
Manganese	0.1	0.0	0.1	0.1	0.2
Phenol	0.02	0.02	0.01	0.05	0.02
B.O.D.	6.8	5.0	6.0	6.8	5.8
D.O.	4.0	sat.	6.7	2.9	3.8
D.O. % Sat.	46	--	72	33	42
Stream Temp. °C.	23	19	19	22	21

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v.	- very	sat.	- saturated
sl.	- slight	% sat.	- percent of saturation
lt.	- light	°C.	- degrees centigrade

Table 10
RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled October 6, 1959

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	sl. brown	sl. brown	sl. brown	sl. brown	sl. brown
Color	--	--	--	--	--
Odor	faint musty	distinct musty	distinct musty	faint musty	distinct musty
Turbidity	--	--	--	--	--
pH	7.4	7.3	6.9	7.2	7.1
Alkalinity	72	54	50	66	66
Acidity, Hot pH 8	--	--	--	--	--
Hardness	--	--	--	--	--
Chloride	12	9	11	18	16
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	--	--	--	--	--
Total Solids	--	--	--	--	--
Suspended Solids	--	--	--	--	--
Aluminum	--	--	--	--	--
Total Iron	0.8	1.2	1.6	1.2	2.0
Manganese	--	--	--	--	0.2
Phenol	0	0.01	0.02	0.04	0.03
B.O.D.	--	--	--	--	--
D.O.	4.0	7.5	7.0	3.1	3.5
D.O. % Sat.	47	84	78	36	40
Stream Temp. °C.	24	21	21	23	23

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light

sat. - saturated
% sat.- percent of saturation
°C. - degrees centigrade

Table 11
RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled November 6, 1959

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	v. sl. brown	v. sl. brown	v. sl. brown	v. sl. brown	v. sl. brown
Color	10	15	10	15	20
Odor	v. faint earthy	no odor	faint earthy	v. faint earthy	v. faint earthy
Turbidity	25	10	20	30	20
pH	7.3	7.2	7.4	7.2	7.2
Alkalinity	74	56	52	70	70
Acidity, Hot pH 8	0	0	0	0	0
Hardness	135	95	85	165	165
Chloride	14	12	8	15	16
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	78	67	52	100	102
Total Solids	280	190	200	340	320
Suspended Solids	30	15	30	45	60
Aluminum	0	0	0	0	--
Total Iron	2.2	0.8	1.0	2.8	2.4
Manganese	0.0	0.3	0	0.0	0.6
Phenol	0	0	0	0	0
B.O.D.	5.3	4.5	4.2	12.0	4.6
D.O.	8.9	sat.	sat.	8.8	9.3
D.O. % Sat.	87	—	--	83	83
Stream Temp. °C.	14.5	14	12	13	10.5

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light

sat. - saturated
% sat.- percent of saturation
°C. - degrees centigrade

Table 12
RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled January 5, 1960

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	brown	brown	brown	brown	brown
Color	75	50	50	80	80
Odor	faint musty	v. faint musty	distinct musty	distinct disag.	faint musty
Turbidity	40	40	30	60	50
pH	6.4	6.4	6.3	6.4	6.3
Alkalinity	40	32	32	44	44
Acidity, Hot pH 8	0	0	0	0	0
Hardness	98	70	66	125	125
Chloride	7	5	3	11	11
Fluoride	--	--	--	--	--
Cyanide	--	--	---	--	--
Sulfate	52	44	39	73	73
Total Solids	210	150	200	330	340
Suspended Solids	55	45	25	115	90
Aluminum	0.1	0.1	0.1	0.1	0.1
Total Iron	6.8	1.6	1.6	20.0	16.0
Manganese	0.1	0.1	0.1	0.2	0.2
Phenol	0.02	0	0	0.01	0.05
B.O.D.	4.4	4.2	4.0	9.6	6.6
D.O.	sat.	sat.	sat.	sat.	sat.
D.O. % Sat.	--	--	--	--	--
Stream Temp. °C.	8	2	3	10	10

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light

sat. - saturated
% sat. - percent of saturation
°C. - degrees centigrade

Table 13
RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled February 1, 1960

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	v. sl. brown	v. sl. brown	v. sl. brown	sl. brown	sl. brown
Color	40	30	35	70	70
Odor	v. faint chemical	v. faint chemical	v. faint musty	faint chemical	faint chemical
Turbidity	25	25	20	40	50
pH	6.4	6.2	6.5	6.5	6.6
Alkalinity	50	44	50	50	52
Acidity, Hot pH 8	0	0	0	0	0
Hardness	115	88	80	150	150
Chloride	15	8	20	19	19
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	71	48	45	115	110
Total Solids	230	160	140	330	330
Suspended Solids	30	20	10	50	50
Aluminum	0.1	0.1	0.1	0.2	0.5
Total Iron	5.0	1.6	1.0	10.0	14.0
Manganese	0.2	0.0	0.0	0.0	0.2
Phenol	0.05	0	0.1	0.15	0.10
B.O.D.	4.4	4.4	4.4	8.0	5.0
D.O.	sat.	sat.	sat.	sat.	sat.
D.O. % Sat.	--	--	--	--	--
Stream Temp. °C.	8	1	4	12	11

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v.	- very	sat.	- saturated
sl.	- slight	% sat.	- percent of saturation
lt.	- light	°C.	- degrees centigrade

Table 14
RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled March 2, 1960

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	sl. brown	sl. brown	sl. brown	sl. brown	sl. brown
Color	30	40	30	40	50
Odor	faint musty	distinct musty	faint musty	distinct musty	distinct musty
Turbidity	15	15	25	25	35
pH	6.4	6.8	6.5	6.4	6.6
Alkalinity	56	64	64	64	64
Acidity, Hot pH 8	0	0	0	0	0
Hardness	152	102	108	180	198
Chloride	23	10	14	36	32
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	200	54	100	140	125
Total Solids	270	180	290	410	440
Suspended Solids	20	20	40	30	40
Aluminum	0.01	0.01	0.02	0.01	0
Total Iron	2.2	2.2	4.0	8.0	10.0
Manganese	0.7	0.8	1.8	1.0	1.0
Phenol	0.03	0	0.02	0.05	0.06
B.O.D.	6.2	5.4	5.8	9.0	6.2
D.O.	sat.	sat.	sat.	9.3	9.1
D.O. % Sat.	—	--	--	88	84
Stream Temp. °C.	9	6	5	13	12

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light
sat. - saturated
% sat.- percent of saturation
°C. - degrees centigrade

Table 15
RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled April 19, 1960

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	sl. brown	v. sl. brown	sl. brown	sl. brown	v. sl. brown
Color	20	30	15	15	15
Odor	v. faint musty	distinct musty	faint musty	v. faint musty	v. faint musty
Turbidity	15	15	15	15	10
pH	7.3	7.2	7.4	7.2	7.8
Alkalinity	70	70	66	60	70
Acidity, Hot pH 8	0	0	0	0	0
Hardness	140	100	80	200	200
Chloride	15	7	7	29	27
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	80	50	46	155	150
Total Solids	220	150	110	340	380
Suspended Solids	15	15	20	20	10
Aluminum	0	0.05	0.05	0	0
Total Iron	0.8	1.0	1.0	1.0	2.8
Manganese	0.1	0.2	0.2	0.4	0.7
Phenol	0.15	0.1	0	0.0	0.05
B.O.D.	3.4	13.0	5.4	6.1	5.4
D.O.	8.6	9.7	9.0	5.6	5.6
D.O. % Sat.	85	88	82	59	59
Stream Temp. °C.	15	11	11.5	18	18

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light

sat. - saturated
% sat.- percent of saturation
°C. - degrees centigrade

Table 16
RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled May 4, 1960

Analysis	**Station 1**	**Station 2**	**Station 3**	**Station 4**	**Station 5**
Appearance	sl. brown	sl. brown	v. sl. brown	v. sl. brown	v. sl. brown
Color	15	20	20	10	10
Odor	distinct musty	v. faint musty	v. faint musty	v. faint musty	v. faint musty
Turbidity	20	15	10	15	10
pH	6.8	7.5	7.4	6.8	7.0
Alkalinity	60	94	125	60	70
Acidity, Hot pH 8	0	0	0	0	0
Hardness	200	135	125	260	260
Chloride	27	12	12	29	29
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	135	70	64	220	220
Total Solids	360	210	180	480	480
Suspended Solids	10	20	10	20	10
Aluminum	0.05	0.1	0.05	0.1	0.05
Total Iron	0.2	0.5	0.2	0.1	0.2
Manganese	0.3	0.2	0.3	0.5	0.3
Phenol	0	0	0	0	0
B.O.D.	--	--	--	--	--
D.O.	6.1	sat.	8.2	6.1	5.2
D.O. % Sat.	66	--	83	70	59
Stream Temp. °C.	19.5	16	16.5	23	22.5

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v.	- very	sat.	- saturated
sl.	- slight	% sat.	- percent of saturation
lt.	- light	°C.	- degrees centigrade

Table 17
RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled June 7, 1960

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	v. sl. brown	v. sl. brown	v. sl. brown	v. sl. brown	v. sl. brown
Color	15	20	25	20	10
Odor	v. faint musty	no odor	no odor	faint musty	no odor
Turbidity	15	10	20	15	15
pH	7.4	7.7	7.0	7.3	7.0
Alkalinity	80	86	84	90	90
Acidity, Hot pH 8	--	--	0	0	0
Hardness	145	115	88	205	195
Chloride	16	9	6	33	33
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	60	45	40	95	110
Total Solids	300	210	180	440	420
Suspended Solids	20	--	20	10	--
Aluminum	0.1	0.1	0.1	0.1	0.1
Total Iron	0.6	0.6	1.4	1.2	1.4
Manganese	0	0	0	0.4	0.5
Phenol	0	0.2	0	0.2	0.1
B.O.D.	6.4	9.6	4.4	10.4	13+
D.O.	5.3	8.6	6.7	4.1	4.0
D.O. % Sat.	60	94	73	48	47
Stream Temp. °C.	22	20	20	24.5	24

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light

sat. - saturated
% sat.- percent of saturation
°C. - degrees centigrade

Table 18

RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled July 6, 1960

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	v. sl. brown	v. sl. brown	v. sl. brown	v. sl. brown	v. sl. brown
Color	25	25	20	40	30
Odor	faint musty	faint musty	v. faint musty	no odor	faint musty
Turbidity	25	30	30	30	25
pH	7.4	7.4	7.4	7.0	7.1
Alkalinity	80	80	66	68	64
Acidity, Hot pH 8	0	0	0	0	0
Hardness	170	120	100	180	190
Chloride	14	8	8	24	12
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	83	48	40	115	110
Total Solids	320	240	370	400	370
Suspended Solids	25	30	30	30	25
Aluminum	0.3	0.3	0.1	0.2	0.1
Total Iron	0.9	1.0	2.2	1.4	2.0
Manganese	0.1	0.1	0.1	0.2	0.3
Phenol	0.05	0.05	0.1	0.1	0.05
B.O.D.	7.6	9.6	6.0	6.0	6.4
D.O.	4.6	8.1	7.0	3.3	3.6
D.O. % Sat.	52	87	76	38	42
Stream Temp. °C.	22	19	20	23	23

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light

sat. - saturated
% sat. - percent of saturation
°C. - degrees centigrade

Table 19

RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled July 20, 1960

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	sl. brown	sl. brown	sl. brown	sl. brown	sl. brown
Color	15	25	20	40	40
Odor	distinct musty	distinct musty	faint musty	faint musty	distinct musty
Turbidity	20	25	25	15	25
pH	7.2	7.4	7.0	7.1	7.2
Alkalinity	74	82	62	105	78
Acidity, Hot pH 8	0	0	0	0	0
Hardness	190	130	105	210	210
Chloride	19	9	9	30	31
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	110	58	46	140	135
Total Solids	380	280	240	440	440
Suspended Solids	40	25	30	20	30
Aluminum	0.2	0.3	0.2	0.3	0.2
Total Iron	1.3	2.2	2.6	1.8	2.0
Manganese	0.2	0.2	0.1	0.8	0.2
Phenol	0.1	0.1	0.1	0.2	0.1
B.O.D.	11.2	6.2	8.6	11.0	10.8
D.O.	3.9	7.5	4.4	2.6	3.1
D.O. % Sat.	48	86	51	33	40
Stream Temp. °C.	26	23	23	28	29

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light

sat. - saturated
% sat.- percent of saturation
°C. - degrees centigrade

Table 20

RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled August 3, 1960

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	v. sl. brown	v. sl. brown	v. sl. brown	v. sl. brown	v. sl. brown
Color	25	35	25	25	35
Odor	distinct musty	distinct musty	distinct musty	distinct musty	distinct musty
Turbidity	25	35	25	25	25
pH	6.7	7.1	6.9	7.1	7.1
Alkalinity	80	84	80	90	80
Acidity, Hot pH 8	--	--	--	--	--
Hardness	200	160	120	210	200
Chloride	17	8	10	25	24
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	107	63	54	117	126
Total Solids	360	270	220	410	400
Suspended Solids	20	30	40	20	40
Aluminum	0.2	0.1	0.2	0.2	0.3
Total Iron	1.0	2.8	2.0	1.0	1.8
Manganese	0.3	0.2	0.1	0.3	0.3
Phenol	0	0	0	0	0
B.O.D.	11.5	5.0	4.3	8.8	11.7
D.O.	3.2	6.7	4.5	3.1	1.9
D.O. % Sat.	39	77	53	39	24
Stream Temp. °C.	26.5	23	24	28	28

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light

sat. - saturated
% sat.- percent of saturation
°C. - degrees centigrade

Table 21

RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled August 24, 1960

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	sl. brown	sl. brown	sl. brown	sl. brown	sl. brown
Color	20	20	20	20	25
Odor	distinct musty	faint musty	faint musty	distinct musty	faint musty
Turbidity	15	20	20	25	15
pH	7.3	7.1	7.2	6.9	7.1
Alkalinity	80	66	72	66	70
Acidity, Hot pH 8	0	0	0	0	0
Hardness	190	155	110	210	210
Chloride	21	11	15	33	31
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	120	63	50	146	141
Total Solids	340	190	160	380	390
Suspended Solids	20	20	40	40	20
Aluminum	0.50	0.25	0.14	0.25	1.0
Total Iron	0.5	0.6	0.8	2.4	2.5
Manganese	0	0.2	0.05	0.3	0.2
Phenol	0	0	0	0	0
B.O.D.	5.4	2.7	3.3	9.0	11.0
D.O.	3.4	6.8	4.9	3.3	3.8
D.O. % Sat.	41	77	56	41	47
Stream Temp. °C.	25	22	22	27	27

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light

sat. - saturated
% sat.- percent of saturation
°C. - degrees centigrade

Table 22

RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled September 7, 1960

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	sl. brown	sl. brown	sl. brown	sl. brown	sl. brown
Color	5	20	25	10	5
Odor	faint musty	v. faint musty	faint earthy	faint musty	v. faint musty
Turbidity	10	20	30	20	20
pH	6.9	7.2	7.1	7.4	6.9
Alkalinity	50	70	58	60	46
Acidity, Hot pH 8	0	0	0	0	0
Hardness	190	120	90	245	240
Chloride	22	9	8	29	29
Fluoride	116	--	50	150	140
Cyanide	--	--	--	--	--
Sulfate	--	--	--	--	--
Total Solids	340	240	190	450	380
Suspended Solids	10	20	60	30	20
Aluminum	0	0	0	0	0
Total Iron	1.2	1.0	2.8	0.6	0.7
Manganese	0.1	0.2	0.1	0.3	0.2
Phenol	--	--	--	--	--
B.O.D.	--	--	--	--	--
D.O.	3.3	7.2	5.3	2.9	3.3
D.O. % Sat.	41.6	83.9	60.7	36.6	41.6
Stream Temp. °C.	27	23	22	27	27

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light

sat. - saturated
% sat.- percent of saturation
°C. - degrees centigrade

Table 23

RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled September 28, 1960

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	sl. brown	sl. brown	sl. brown	sl. brown	sl. brown
Color	20	10	10	15	15
Odor	faint grassy	faint grassy	v. faint musty	faint grassy	faint musty
Turbidity	20	20	30	20	20
pH	6.8	7.1	7.0	7.2	7.2
Alkalinity	68	70	62	82	90
Acidity, Hot pH 8	0	0	0	0	0
Hardness	240	120	90	265	250
Chloride	24	9	24	32	27
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	118	60	48	140	120
Total Solids	320	220	160	400	430
Suspended Solids	20	10	40	20	20
Aluminum	0	0	0	0	0
Total Iron	2.0	1.0	2.0	0.6	0.8
Manganese	0.2	0.2	0.1	0.2	0.3
Phenol	0.0	0.0	0.0	0.0	0.0
B.O.D.	8.6	6.3	4.1	3.6	4.5
D.O.	2.9	7.2	4.2	2.7	3.0
D.O. % Sat.	35.4	77.7	46.2	33.1	37.3
Stream Temp. °C.	25	19.5	20	26	26.5

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light
sat. - saturated
% sat.- percent of saturation
°C. - degrees centigrade

Table 24

RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled October 19, 1960

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	v. sl. brown	v. sl. brown	v. sl. brown	v. sl. brown	v. sl. brown
Color	20	25	20	20	20
Odor	faint earthy	v. faint musty	v. faint musty	v. faint musty	faint musty
Turbidity	20	25	25	10	10
pH	7.0	7.0	7.1	7.1	7.0
Alkalinity	62	72	62	76	72
Acidity, Hot pH 8	0	0	0	0	0
Hardness	--	--	--	--	--
Chloride	26	16	10	33	30
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	190	82	62	268	256
Total Solids	360	210	190	480	450
Suspended Solids	20	60	20	20	20
Aluminum	0.2	0.1	0	0.1	0
Total Iron	0.6	2.4	0.8	0.4	1.2
Manganese	0.5	0	0	0.3	0.3
Phenol	0	0	0	0	0
B.O.D.	7.6	8.2	5.0	7.6	11.0
D.O.	3.6	7.3	5.6	2.4	3.4
D.O. % Sat.	39.8	69.5	54.0	27.0	37.5
Stream Temp. °C.	19.5	13	14	20	20

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light

sat. - saturated
% sat.- percent of saturation
°C. - degrees centigrade

Table 25
RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled November 16, 1960

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	lt. green	lt. green	lt. green	brown green	brown green
Color	10	20	30 ✓	15	10
Odor	faint musty	distinct musty	faint musty	distinct musty	faint musty
Turbidity	15	10	20	10	10
pH	6.1	7.4	7.4	7.1	7.4
Alkalinity	70	94	120	100	92
Acidity, Hot pH 8	0	0	0	0	0
Hardness	220	160	130	265	265
Chloride	27	15	12	32	32
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	190	86	76	260	260
Total Solids	380	270	200	460	470
Suspended Solids	30	20	20	30	10
Aluminum	0	0.2	0.1	0.1	0.1
Total Iron	1.0	1.0	1.2	0.4	0.8
Manganese	0.3	0.3	0.3	0.3	0.2
Phenol	0	0	0	0	0
B.O.D.	7.3	5.8	4.9	5.1	3.6
D.O.	5.2	8.0	6.0	3.2	4.0
D.O. % Sat.	54.2	71.3	55.5	33.2	41.1
Stream Temp. °C.	17	10	11.5	17.5	17

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light

sat. - saturated
% sat.- percent of saturation
°C. - degrees centigrade

Table 26
RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled December 14, 1960

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	brown	lt. brown	lt. brown	brown	brown
Color	15	15	25	20	25
Odor	distinct musty	distinct musty	distinct musty	distinct musty	distinct musty
Turbidity	15	15	25	20	30
pH	7.5	7.8	7.4	7.1	7.2
Alkalinity	115	125	105	115	105
Acidity, Hot pH 8	0	0	--	0	0
Hardness	245	190	--	255	270
Chloride	40	18	23	48	48
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	215	120	110	280	280
Total Solids	470	320	580	590	570
Suspended Solids	20	20	30	20	30
Aluminum	0.2	0.2	0.2	0.1	0.2
Total Iron	0.8	0.6	0.8	1.0	1.2
Manganese	0.5	0.1	0.25	0.4	0.4
Phenol	0.025	0	0.015	0.045	0.05
B.O.D.	3.5	3.5	3.8	4.1	4.6
D.O.	8.0	12.0	11.0	7.0	8.0
D.O. % Sat.	62.5	81.9	75.0	53.3	57.8
Stream Temp. °C.	5	0	0	4	2

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very	sat. - saturated
sl. - slight	% sat. - percent of saturation
lt. - light	°C. - degrees centigrade

Table 27

RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled January 17, 1961 & January 18, 1961

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	lt. green brown	lt. green brown	lt. green	lt. green	lt. green
Color	15	10	15	10	10
Odor	distinct musty	faint musty	distinct musty	distinct musty	faint musty
Turbidity	5	5	10	5	15
pH	6.9	7.1	7.2	6.7	6.8
Alkalinity	100	100	100	94	110
Acidity, Hot pH 8	--	0	0	0	0
Hardness	--	--	--	--	--
Chloride	34	20	20	55	53
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	184	92	64	308	308
Total Solids	340	240	240	590	600
Suspended Solids	10	10	10	10	15
Aluminum	0.1	0.2	0	0	0
Total Iron	1.2	1.2	1.4	1.	2.
Manganese	0.50	0.10	0.33	1.00	0.90
Phenol	0	0	0	0	0
B.O.D.	5.2	3.8	3.8	4.9	4.4
D.O.	7.3	4.5	9.2	3.1	3.2
D.O. % Sat.	61.2	33.0	68.3	28.5	30.3
Stream Temp. °C.	7.5	2	3	11.5	12

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v.	very	sat.	saturated
sl.	slight	% sat.	percent of saturation
lt.	light	°C.	degrees centigrade

Table 28

RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled February 15, 1961

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	lt. green	lt. green	lt. green	clear	clear
Color	25	10	30	15	20
Odor	distinct musty	faint musty	distinct musty	distinct musty	faint musty
Turbidity	15	10	20	15	20
pH	7.2	8.0	7.8	7.1	7.5
Alkalinity	90	115	110	82	90
Acidity, Hot pH 8	0	0	0	0	0
Hardness	260	180	165	300	300
Chloride	55	31	36	77	70
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	205	95	95	320	32
Total Solids	450	280	280	570	560
Suspended Solids	20	10	15	10	15
Aluminum	0.1	0.1	0	0	0.2
Total Iron	0.8	0.6	0.8	1.2	1.6
Manganese	0.5	0.6	0.7	1.0	1.25
Phenol	0	0	0	0	0
B.O.D.	5.9	5.9	5.9	5.6	6.8
D.O.	3.3	10.5	8.3	2.7	2.4
D.O. % Sat.	27.9	73.5	62.5	24.8	21.7
Stream Temp. °C.	7.5	1	3.5	11.5	11

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light

sat. - saturated
% sat.- percent of saturation
°C. - degrees centigrade

Table 29
RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled April 19, 1961

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	muddy	muddy	muddy	dirty brown	dirty brown
Color	25	35	30	35	30
Odor	v. faint earthy	v. faint earthy	faint musty	v. faint earthy	faint earthy
Turbidity	90	30	30	90	100
pH	7.8	7.2	7.4	7.8	7.5
Alkalinity	84	36	44	74	68
Acidity, Hot pH 8	0	0	0	0	0
Hardness	105	76	70	155	150
Chloride	15	10	10	22	22
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	72	48	36	108	108
Total Solids	300	160	140	350	340
Suspended Solids	130	30	30	90	140
Aluminum	0.1	0.1	0	0.1	0.1
Total Iron	8.4	1.0	1.0	12.0	12.0
Manganese	0.1	0	0	0.5	0.6
Phenol	0.02	0	0	0.045	0.035
B.O.D.	6.8	5.6	6.8	5.2	7.6
D.O.	9.7	11.4	10.3	9.3	9.1
D.O. % Sat.	82.4	92.1	82.9	81.0	77.7
Stream Temp. °C.	8	6.5	6	9	8.5

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light
sat. - saturated
% sat. - percent of saturation
°C. - degrees centigrade

Table 30
RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled June 13, 1961

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	dark brown	dark brown	light brown	red brown	red brown
Color	35	30	30	40	50
Odor	distinct musty	faint musty	v. faint musty	faint musty	faint musty
Turbidity	30	30	25	60	60
pH	7.1	7.0	7.0	6.8	6.8
Alkalinity	58	56	62	56	56
Acidity, Hot pH 8	0	0	0	0	0
Hardness	124	100	120	152	144
Chloride	10	4	7	16	16
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	72	62	62	123	108
Total Solids	270	130	240	350	350
Suspended Solids	20	10	10	40	50
Aluminum	0	0	0	0	0
Total Iron	2.	1.0	1.2	0.6	5.0
Manganese	0.2	0	0.1	0.4	0.33
Phenol	0	0	0	0	0
B.O.D.	6.0	1.0	6.0	7.6	6.8
D.O.	4.3	6.9	5.2	1.0	1.4
D.O. % Sat.	51.5	78.9	60.8	12.7	17.5
Stream Temp. °C.	25	22	23	26	26

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light

sat. - saturated
% sat. - percent of saturation
°C. - degrees centigrade

Table 31
RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled July 5, 1961

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	sl. brown	sl. brown	sl. brown	sl. brown	sl. brown
Color	25	25	30	30	30
Odor	faint musty	faint musty	faint musty	faint musty	faint musty
Turbidity	30	30	35	35	35
pH	7.2	7.2	7.1	7.0	6.9
Alkalinity	52	62	60	48	46
Acidity, Hot pH 8	0	0	0	0	0
Hardness	138	112	100	186	200
Chloride	12	5	5	18	18
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	91	53	48	146	153
Total Solids	280	210	210	360	360
Suspended Solids	50	50	60	30	30
Aluminum	0	0	0	0	0
Total Iron	2.8	2.0	3.4	5.0	3.4
Manganese	0.25	0.1	0.1	0.5	0.5
Phenol	0.0	0.0	0.0	0.0	0.0
B.O.D.	9.6	3.5	6.9	9.4	9.2
D.O.	4.3	7.0	4.4	2.8	2.7
D.O. % Sat.	49.7	78.4	49.0	32.8	31.9
Stream Temp. °C.	23	21	21	24	24

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v.	very	sat.	saturated
sl.	slight	% sat.	percent of saturation
lt.	light	°C.	degrees centigrade

Table 32
RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled August 30, 1961

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	--	--	--	--	--
Color	25	25	35	25	30
Odor	distinct musty	faint musty	distinct musty	faint musty	distinct musty
Turbidity	25	25	30	15	20
pH	6.5	7.1	7.1	6.4	6.5
Alkalinity	44	54	84	44	50
Acidity, Hot pH 8	--	--	--	--	--
Hardness	200	128	104	235	230
Chloride	23	10	9	28	28
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	248	100	76	336	336
Total Solids	300	280	240	490	500
Suspended Solids	20	10	20	10	20
Aluminum	0	0	0	0	0
Total Iron	1.2	0.6	2.0	2.0	1.2
Manganese	0.5	0.5	0.0	0.6	0.6
Phenol	0.03	0.02	0.01	0.04	0.05
B.O.D.	9.7	2.3	5.4	6.1	5.4
D.O.	1.8	6.8	4.4	2.0	1.9
D.O. % Sat.	22.4	77.0	50.6	24.8	23.4
Stream Temp. °C.	26	22	23	25	26

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light
sat. - saturated
% sat. - percent of saturation
°C. - degrees centigrade

Table 33
RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled September 20, 1961

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	green	light green	light green	muddy green	muddy green
Color	15	15	25	15	20
Odor	faint musty	distinct musty	distinct musty	faint musty	distinct musty
Turbidity	15	10	15	10	10
pH	6.9	6.8	7.0	7.0	7.0
Alkalinity	48	48	50	52	50
Acidity, Hot pH 8	0	--	--	--	--
Hardness	175	105	84	270	245
Chloride	23	10	10	30	30
Fluoride	--	--	--	--	--
Cyanide	--	--	--	--	--
Sulfate	168	58	53	238	268
Total Solids	420	190	170	530	490
Suspended Solids	5	15	20	5	10
Aluminum	0	0	0	0	0
Total Iron	0.6	2.0	1.8	0.3	0.4
Manganese	0.80	0.13	0.15	0.60	1.00
Phenol	0.01	0	0	0.03	0.02
B.O.D.	6.8	5.4	1.8	6.2	6.0
D.O.	2.4	sat.	6.1	2.4	2.3
D.O. % Sat.	31.3	--	72.3	32.2	29.8
Stream Temp. °C.	28	23	24	28.5	29

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v.	- very	sat.	- saturated
sl.	- slight	% sat.	- percent of saturation
lt.	- light	°C.	- degrees centigrade

Table 34
RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled January 4, 1965

Analysis	Station 1	Station 2	Station 3	Station 4	Station 5
Appearance	muddy	muddy	muddy	muddy	muddy
Color	25	25	25	25	25
Odor	earthy	earthy	earthy	earthy	earthy
Turbidity	270	250	250	280	270
pH	6.1	6.2	7.0	6.6	6.4
Alkalinity	58	58	60	58	62
Acidity, Hot pH 8	0	0	0	0	0
Hardness	180	180	180	180	180
Chloride	70	70	68	68	66
Fluoride	0.8	0.8	0.4	0.4	0.8
Cyanide	0.03	0.04	0.04	0.03	0.03
Sulfate	91	96	91	96	96
Total Solids	620	560	600	520	480
Suspended Solids	300	360	300	240	260
Aluminum	0	0.10	0.21	0	0.09
Total Iron	56	60	64	42	44
Manganese	0.5	0.5	0.5	0.4	0.5
Phenol	0.08	0.09	0.10	0.11	0.9
B.O.D.	12.5	13	14	11	12
D.O.	8.2	8.2	8.6	9.0	8.7
D.O. % Sat.	65.0	65.0	69.0	72.0	66.5
Stream Temp. °C.	6	6	6	6	4

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light

sat. - saturated
% sat. - percent of saturation
°C. - degrees centigrade

Table 35

RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled January 6, 1965

Analysis	Station 4	Station 5	Station 6	Station 7	Station 8
Appearance	brown	brown	brown	brown	brown
Color	20	25	25	25	5
Odor	musty	musty	disagreeable	disagreeable	musty
Turbidity	80	85	80	65	160
pH	6.2	6.1	6.2	6.2	5.8
Alkalinity	38	34	38	40	22
Acidity, Hot pH 8	0	0	0	0	30
Hardness	180	180	180	180	180
Chloride	38	38	40	41	40
Fluoride	0.5	0.6	0.5	0.6	0.6
Cyanide	0.11	0.12	0.08	0.09	0.09
Sulfate	128	136	136	128	183
Total Solids	380	380	420	400	440
Suspended Solids	160	100	120	60	80
Aluminum	0.13	0.13	0.24	0.27	0.31
Total Iron	13.0	11.0	13.0	6.8	26.0
Manganese	0.66	0.66	0.66	0.60	0.80
Phenol	0.18	0.19	0.17	0.17	0.19
B.O.D.	9.5	8.5	10.0	8.0	13
D.O.	7.8	7.8	6.8	7.8	6.1
D.O. % Sat.	70	69	59.5	69	55
Stream Temp. °C.	11	10	10	10	11

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light

sat. - saturated
% sat.- percent of saturation
°C. - degrees centigrade

RESULTS OF CHEMICAL ANALYSIS
BEAVER RIVER BASIN

Date Sampled January 11, 1965

Analysis	Station 4	Station 5	Station 6	Station 7	Station 8
Appearance	brown	grayish brown	brown	brown	yellowish brown
Color	30	40	30	40	50
Odor	distinct musty	distinct musty	distinct musty	distinct musty	decided musty
Turbidity	120	120	130	130	120
pH	6.0	6.0	5.7	5.8	6.0
Alkalinity	32	32	26	24	30
Acidity, Hot pH 8	--	--	--	--	--
Hardness	150	150	150	150	155
Chloride	28	28	27	28	28
Fluoride	—	0.4	0.4	0.4	0.4
Cyanide	0.05	0.05	0.05	0.04	0.055
Sulfate	91	96	86	96	96
Total Solids	360	360	280	400	340
Suspended Solids	120	100	100	120	120
Aluminum	0	0	0	--	0
Total Iron	38	20	20	40	32
Manganese	0.33	0.40	0.40	0.50	0.40
Phenol	0.075	0.08	0.085	0.085	0.09
B.O.D.	10	13.5	8.5	10	12
D.O.	9.3	9.4	9.2	9.0	9.5
D.O. % Sat.	74	71	67	69	76
Stream Temp. °C.	6	4	3	4	6

Remarks: All results except pH expressed in mg/l unless otherwise indicated.

Abbreviations:

v. - very
sl. - slight
lt. - light

sat. - saturated
% sat.- percent of saturation
°C. - degrees centigrade

Table 37

BEAVER RIVER SURVEY
RESULTS OF BACTERIOLOGICAL ANALYSES
Coliform Organisms/100 ml

Date Sampled	Station 1	Station 2	Station 3	Station 4	Station 5
9/15/59	4,300	43,000	43,000	93,000	1,110,000
9/23/59	43,000	930	21,000	2,400,000	4,300
10/6/59	530	23,000	4,300	93,000	23,000
11/6/59	9,300	1,500	4,300	15,000	24,000
1/5/60	390,000	15,000	750,000	2,400,000	210,000
2/1/60	1,600,000	12,000	7,500	4,600,000	1,200,000
3/2/60	240,000	2,400	72	350,000	240,000
5/4/60	4,300	930	2,400	930	430
6/7/60	75,000	930	43,000	150,000	24,000
7/6/60	(4,600,000)	4,300	29,000	150,000	7,500
7/20/60	24,000*	9,300+	24,000	24,000	24,000
8/3/60	11,000,000+	39,000	110,000	390,000	230
8/24/60	9,300	750	640	9,300	4,300
9/7/60	43,000	4,300	93,000	1,110,000	230
9/28/60	2,400,000	24,000	7,500	24,000	9,300
10/19/60	43,000	24,000	93,000	150,000	7,500
11/16/60	24,000	21,000	9,300	1,100,000	9,300
12/14/60	23,000	2,300	930	15,000	2,300
1/17/61	---	4,300	1,500	21,000	---
1/18/61	21,000	---	---	---	2,900
2/15/61	150,000	15,000	43,000	93,000	9,300
4/19/61	1,200,000	210,000	1,200,000	430,000	11,000,000
6/13/61	43,000	4,300	15,000	1,100,000	210,000
7/5/61	240,000	1,100,000	7,500,000	150,000	24,000
8/30/61	110,000	11,000	2,400	15,000	1,100
9/20/61	210,000	---	---	460,000	2,900

Table 37

BEAVER RIVER SURVEY
RESULTS OF BACTERIOLOGICAL ANALYSES
Coliform Organisms/100 ml

Date Sampled	Station 4	Station 5	Station 6	Station 7	Station 8
1/4/65	218,000	253,000,000	156,000	1,100,000	436,000,000
1/6/65	1,100,000+	1,100,000	1,100,000+	1,100,000	1,100,000
1/11/65	25,000,000	11,000,000	1,100,000+	460,000	11,000,000

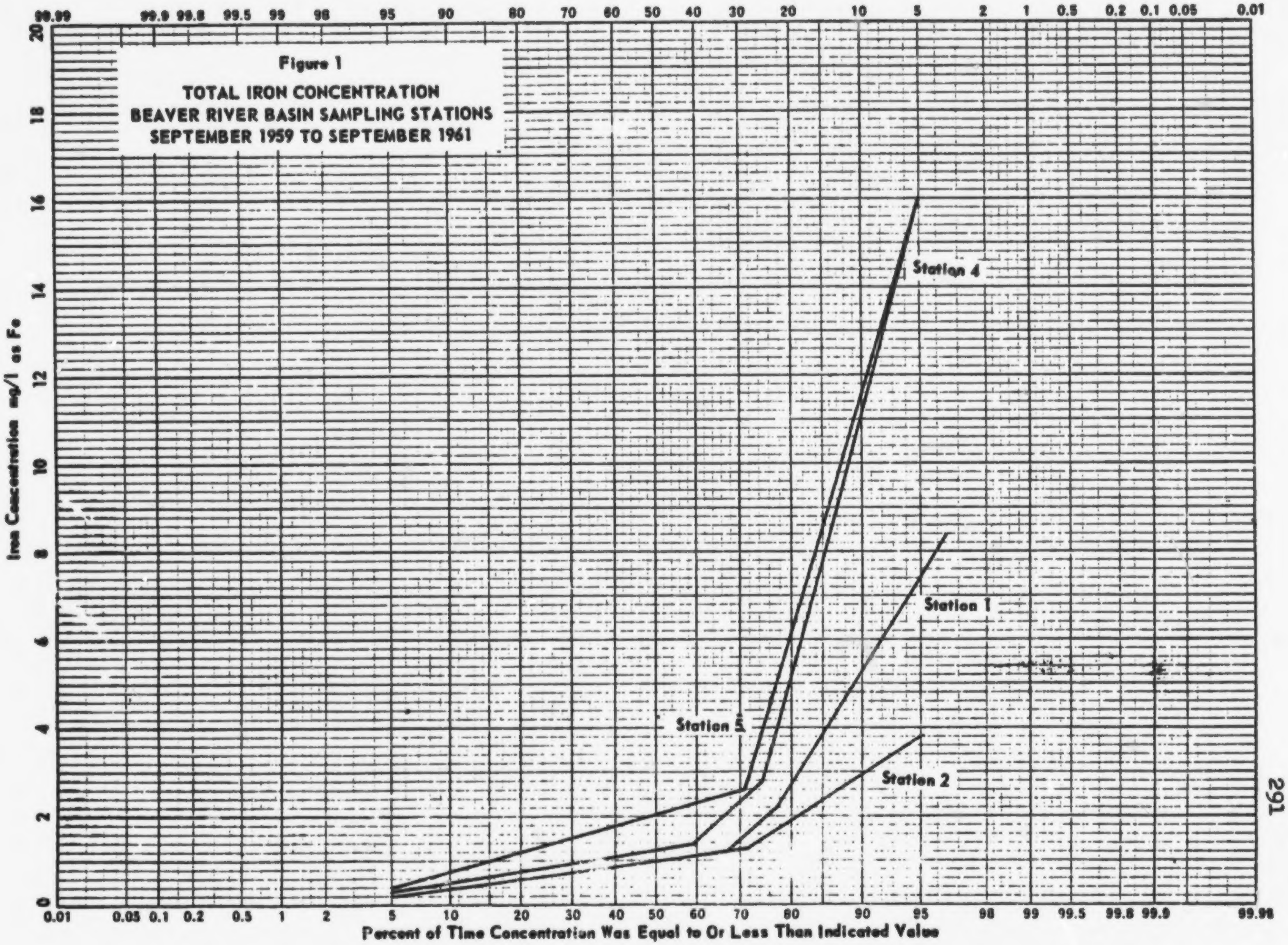


Figure 1

TOTAL IRON CONCENTRATION
BEAVER RIVER BASIN SAMPLING STATIONS
SEPTEMBER 1959 TO SEPTEMBER 1961

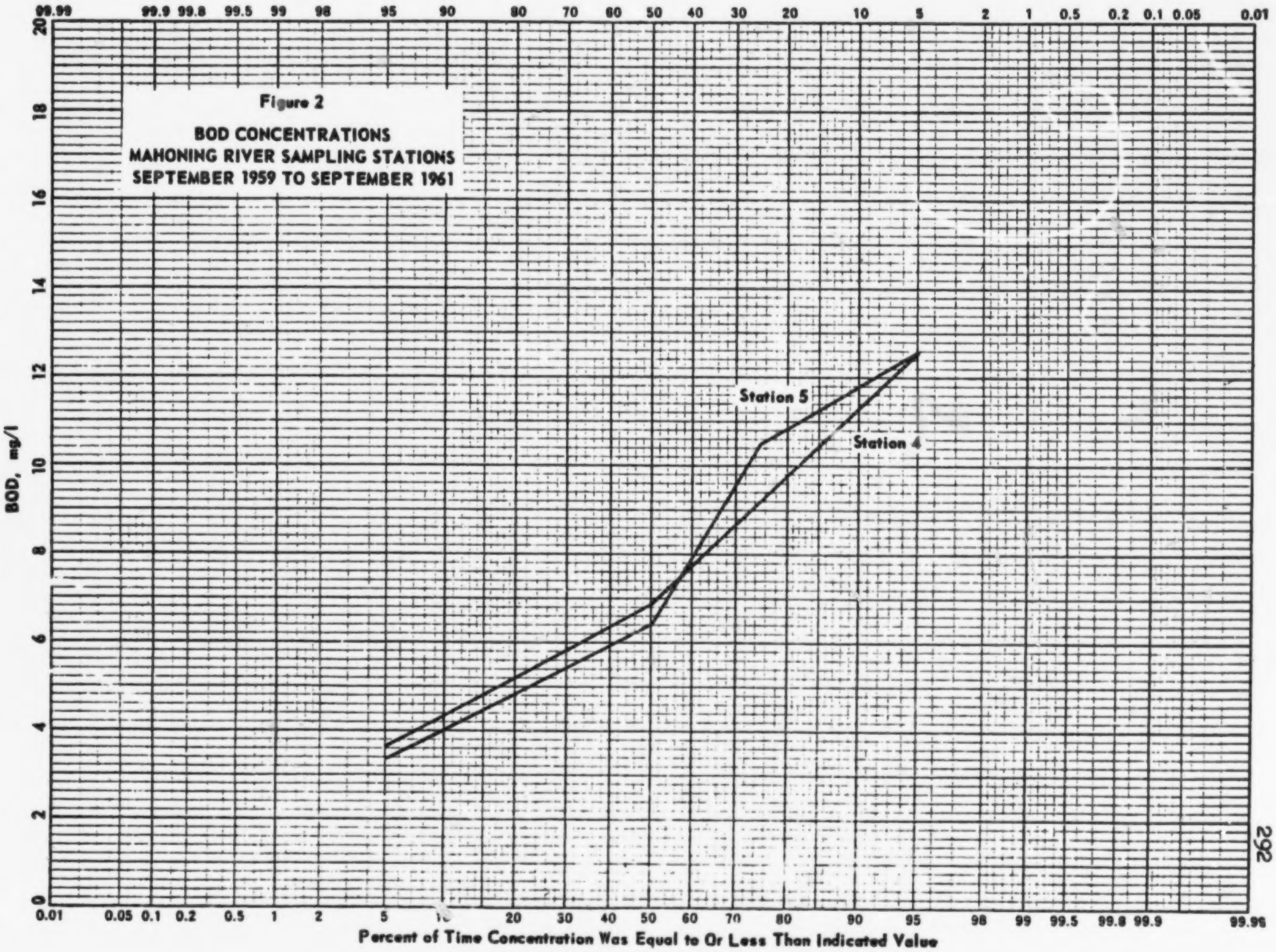


Figure 2

BOD CONCENTRATIONS
MAHONING RIVER SAMPLING STATIONS
SEPTEMBER 1959 TO SEPTEMBER 1961

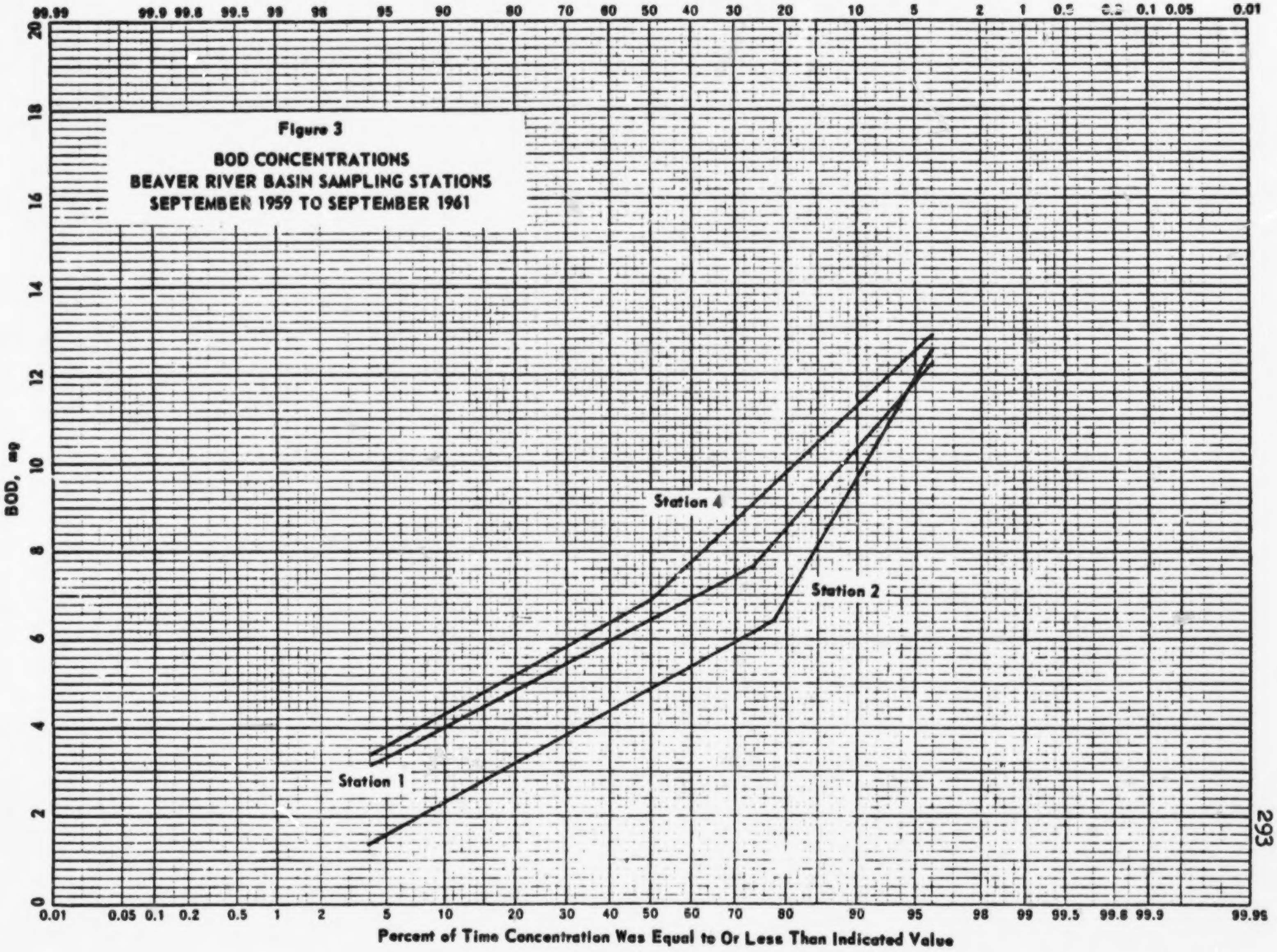


Figure 3

BOD CONCENTRATIONS
BEAVER RIVER BASIN SAMPLING STATIONS
SEPTEMBER 1959 TO SEPTEMBER 1961

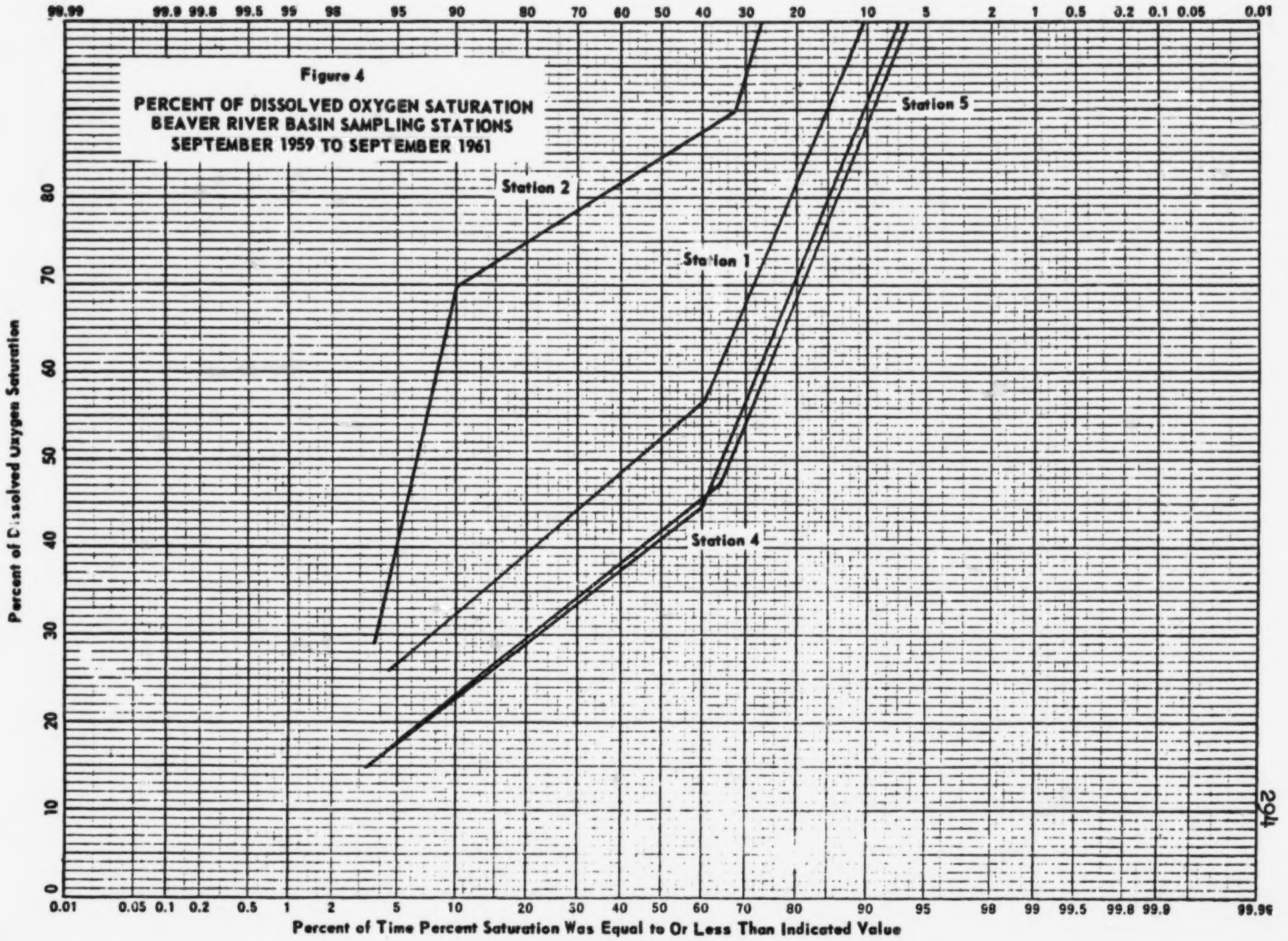
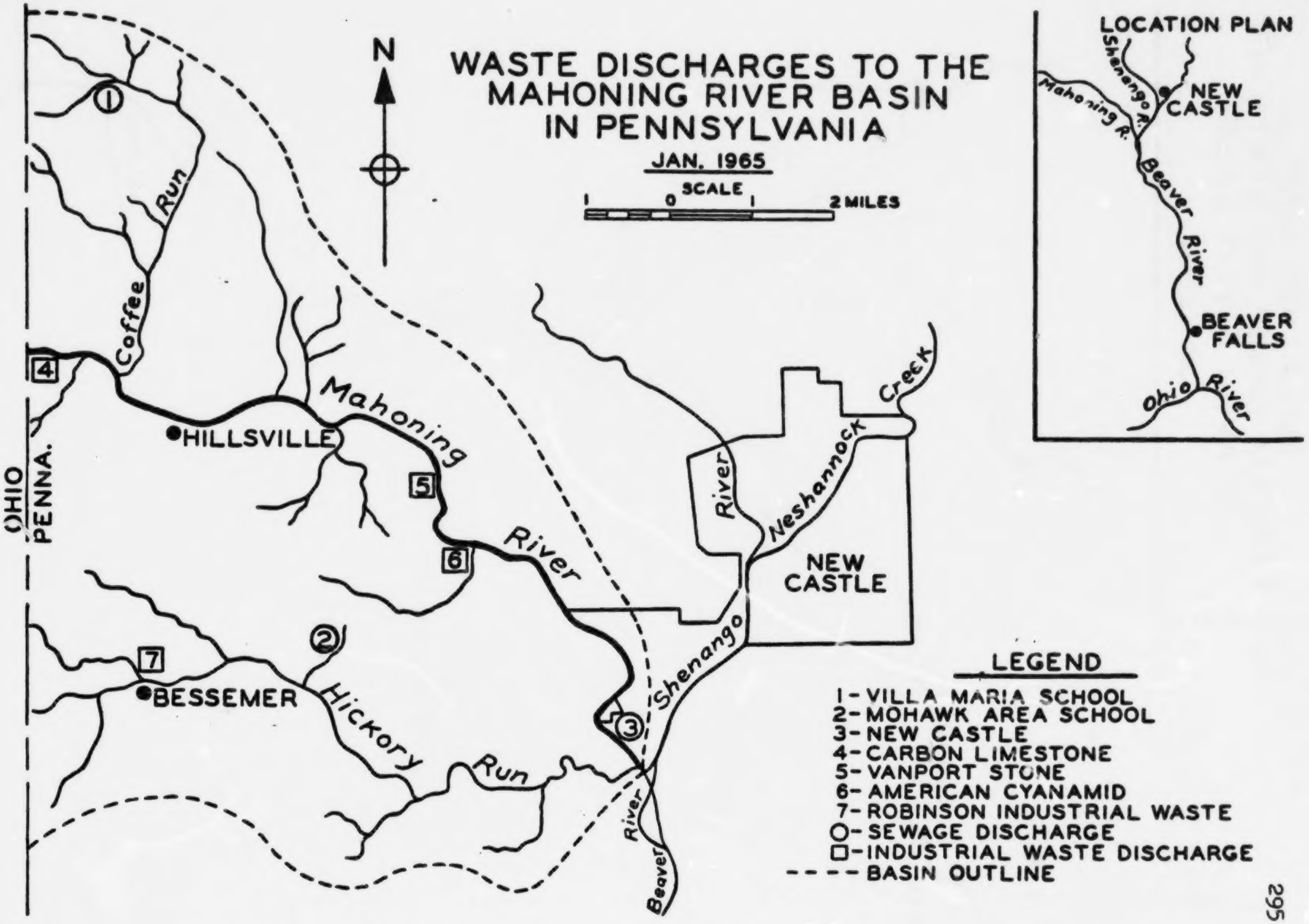


Figure 4

PERCENT OF DISSOLVED OXYGEN SATURATION
BEAVER RIVER BASIN SAMPLING STATIONS
SEPTEMBER 1959 TO SEPTEMBER 1961



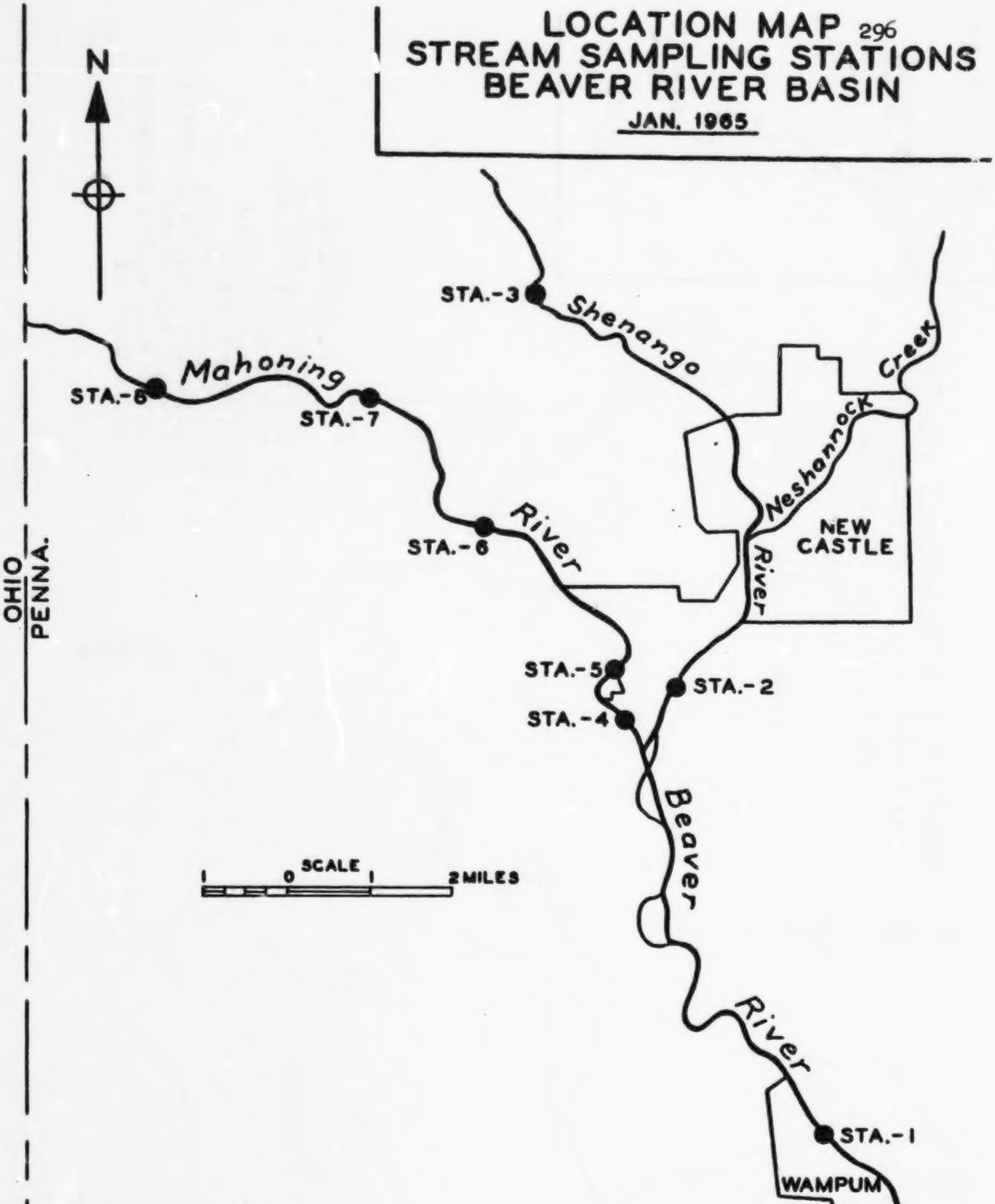
WASTE DISCHARGES TO THE MAHONING RIVER BASIN IN PENNSYLVANIA

JAN. 1965

N
SCALE
1
0
1
2 MILES
OHIO
PENNA.
Coffee Run
Mahoning River
HILLSVILLE
BESSEMER
Hickory Run
Shenango
River
Neshannock Creek
NEW CASTLE
Beaver River
LOCATION PLAN
Shenango R.
Mahoning R.
NEW CASTLE
Beaver River
BEAVER FALLS
Ohio River
1
2
3
4
5
6
7

LEGEND

1 - VILLA MARIA SCHOOL
2 - MOHAWK AREA SCHOOL
3 - NEW CASTLE
4 - CARBON LIMESTONE
5 - VANPORT STONE
6 - AMERICAN CYANAMID
7 - ROBINSON INDUSTRIAL WASTE
○ - SEWAGE DISCHARGE
☐ - INDUSTRIAL WASTE DISCHARGE
- - - BASIN OUTLINE



LOCATION MAP 296
STREAM SAMPLING STATIONS
BEAVER RIVER BASIN

JAN. 1965

N
OHIO
PENNA.
STA.-3
Shenango
STA.-8
Mahoning
STA.-7
Neshannock
Creek
STA.-6
River
River
NEW CASTLE
STA.-5
STA.-2
STA.-4
Beaver
SCALE
1
0
1
2 MILES
River
STA.-1
WAMPUM

... Applause ...

CHAIRMAN STEIN: Thank you, Dr. Wilbar. Are there any comments or questions?

MR. POSTON: In the last conclusion here, it said "It is evident that in addition to water pollution abatement efforts, further water resource development is needed to assure the full range of beneficial uses of the Mahoning River." Does development include increased waste treatment requirements such as perhaps chlorination of all municipal wastes?

DR. WILBAR: I can't entirely answer this. I will ask Mr. Lyon to help me, but it would include further flow augmentation, I think, specifically Mr. Lyon, do you want to add to that? Mr. Lyon is our director of the Sanitary Engineering Department.

MR. LYON: I think you have answered the question. We have experience with similar streams that have this heavy industrial use in Pennsylvania. It is abundantly clear that additional flow regulation in streams like this is essential if the industries in the municipalities grow.

CHAIRMAN STEIN: Mr. Lyon, I think you should take that comment in light of the portion of the statute I read right after the presentation of the slides which indicated the limitation we have on providing augmented low flow and the interpretation put on it by our technical staff which is secondary treatment is appropriate before additional augmented low flow can be provided.

DR. ARNOLD: Dr. Wilbar, may I ask a question?

DR. WILBAR: Just a minute until Mr. Lyon responds to that.

MR. LYON: In answer to your question, Mr. Stein, we understand what the Federal policy is in this regard. However, I don't believe that the Federal Government intended at that time to say that irrespective of what the problems are, this policy will be black or white. It seems to me that in a situation like this there is a very pressing need for rather complete economic analysis as to the benefits of augmenting flow versus the benefits of providing additional treatment. This is certainly one of the things that should have been considered in a situation like this.

DR. WILBAR: Yes, and I might add that we are not only considering the Federal law here, we are considering the needs and all ways of meeting the needs, whether it be through Federal law or state law or ORSANCO or by, simply by some corporation.

CHAIRMAN STEIN: I would certainly

agree with that, Dr. Wilbar, except, Mr. Lyon, I would like to indicate the position you have taken is certainly a very logical one. However, the Congress has spoken of it. They have indicated that augmented low flows will not be a substitute for adequate waste treatment at the source. These views were presented to the Congress when the Congress considered the legislation. I would suggest, if you feel that the legislation doesn't properly express the views that you may have, or you think there is more flexibility, the proper forum for that might be the legislature, the National legislature, rather than us because this is a question that has been thoroughly considered by the Congress.

DR. WILBAR: It may be, Mr. Stein, that even with adequate treatment at the sources there is still a need for the flow.

CHAIRMAN STEIN: No, I think we are all agreed with Dr. Wilbar. I don't think there is any disagreement on that. Once that obtains, certainly if something has to be done to need flow augmentation, that should be done.

DR. ARNOLD: Dr. Wilbar, as Secretary of Health of the Commonwealth of Pennsylvania, it is your opinion that the waste discharges from Ohio into the Mahoning River are, in fact, endangering the health of the people of Pennsylvania?

DR. WILBAR: Well, Dr. Arnold, there is some pollution from the Ohio coming into Pennsylvania. We have had no outbreaks of disease from this pollution and, as has been pointed out so well by the Ohio representatives, the sewage is getting to a point and as soon as the Youngstown plant is open, will be a point where, I think, the danger from any bacterial viral infection will be almost nil.

First the matter of iron and acid and other industrial wastes are not apt to make people ill but they are a nuisance and we also feel, as I have stated, that the program in Ohio, what's been done and what has been promised to be done in the near future, is a good one which should considerably improve the quality of the river.

CHAIRMAN STEIN: Are there any further questions?

DR. ARNOLD: No.

MR. CLEARY: Mr. Chairman, may I make a comment? I heard your comment that the Congress decided a policy, but it is your interpretation of that policy I think that is in question here. Your technical staff has decided that 85 percent removal must constitute adequate treatment. I think that's a matter that is open to question in terms of the frame of reference that Mr. Lyon pointed out. So I don't think we could be completely satisfied over the fact that an administrative decision has been made as an interpretation of what Congress meant. I think many of us might find room for disagreement with that technical interpretation. I just want to make it clear the Congress didn't say 85 percent removal. Congress said adequate treatment of sewage and you have interpreted that to mean 85 percent removal. I think that is the question at issue, as I understand, Mr. Lyon was endeavoring to present to us.

CHAIRMAN STEIN: Mr. Cleary, I am glad you brought that out. I think we well understand that but as you recognize, this provision has been in the law since 1961. The interpretation, if you will, was made shortly after that time. We have gone before the Congress each year for appropriations. Just recently the Senate Public Works Committee has considered amendments to our Act and amended the Act, and the House is now considering amendments to the Act. As far as I know, in legislative history and interpretation, it seems to me that no one has asked for a revision of this or questioned this, and by the fact that this is being left alone, it would seem to me that there is an enforcement of the Federal administrative policy on this. This isn't as if the legislation hadn't been thoroughly gone over and revamped.

Now, again, what I am suggesting is when something like this develops, I am happy to hear this and bring your views back, although I think you are well capable of bringing these views back yourself. But I want to point out, as Mr. Cleary and I think Mr. Lyon well knows, someone else in the program made that interpretation. I didn't do it.

The point is now that with all this gone, I don't know that this is the proper form where we can effect that interpretation or changes. I think you have to look for another form.

MR. CLEARY: Excuse me, Mr. Chairman, but this may not be the proper form, but you are the one that brought it up.

CHAIRMAN STEIN: Excuse me,sir, I have heard references to low flow augmentation all the time. I am afraid this was brought up in the -- and the report will bear this out -- by the states, by the industries, by just the Pennsylvania report; all talking in terms of low flow augmentation. And not only are we getting manna from heaven but we are going to get water from Uncle Sam, and I just wanted to tell you what the ground rules we are living under are so we can approach the facts of life with a little realism.

MR. LYON: Mr. Stein, I don't believe that Congress intended to say that 85 B.O.D. removal would be necessary if the flow augmentation was going to help anything about the industrial waste problem. I am not saying that the 85 percent removal general policy is not a good one; all I am saying is that there is just a possibility that the flow out in the Mahoning would be needed because of the sewage problem, because of the industrial waste problem, and it would seem to me an economical analysis and technical analysis would determine this, but it may not be necessary, possibly, to provide more sewage treatment and it shouldn't be done simply because somebody made a bill that it be 85 if 85 is not needed.

It may be needed but we should make a determination and not blindly follow that rule.

CHAIRMAN STEIN: I don't think anybody blindly follows a rule, otherwise we wouldn't be here today.

MR. POSTON: I would like to pursue Dr. Arnold's question relative to the quality of the water at Beaver Falls and particularly under your recent survey data, Dr. Wilbar, on page 17. And I would read. It says: "The concentrations of iron, b.o.d., and dissolved oxygen were compared to curves which illustrate the range of the values recorded during the two-year survey. The values recorded in 1965 are well above the median values of the two-year survey period, and concentrations of iron and b.o.d. were particularly high."

This, am I interpreting this right, that this infers that the quality now in 1965 is probably not as good as it was at the time of the earlier survey two years ago?

DR. WILBAR: Well, this was taken, as you noted, from my reading, just when a high flow followed a low flow and, as they say, it may reflect the effects of flushout of sludge deposit which accumulated during the period of low flow. It just was one time, a one-time sampling. It wasn't over a period of time so it's hardly an entirely fair comparison.

But it, of course, and on the whole, is hasn't shown very much improvement. We have to say that. But I also point out that a good deal of the treatment which was pointed out today, brought out today, has just been put into effect.

CHAIRMAN STEIN: Do you have anything else? Are there any other comments?

Thank you, Dr. Wilbar, for an excellent and comprehensive report.

DR. WILBAR: May I call on three people?

CHAIRMAN STEIN: We will now pause a moment before we go on because I think we are going to have a problem as to time with the conferees. We are dealing with a question of time. It is 5:30 now. I would like to make an appraisal of the time and see what we can do this evening before we adjourn.

There is one man here from HHFA who says he could be over in two minutes and do you -- how long will these three people take?

DR. WILBAR: Under about 30 minutes among them.

CHAIRMAN STEIN: What's the view of the conferees? Do you think we should handle this for another 30 minutes or not?

MR. CLEARY: Mr. Stein, speaking for myself, I hope you don't have any problem with me. As a conferee, I am willing to stay here and carry on as long as you want to.

CHAIRMAN STEIN: Will the HHFA man be able to stay here for 30 minutes? All right.

DR. WILBAR: There is one thing I wanted to add as long as we are talking about the conduct of the conference, Mr. Chairman, since Mr. Holl and I will not be here tomorrow. I would hope that no definite conclusions from the conference would be arrived at and publicized tomorrow but that all of us would have a chance to review the record and then get together and make these conclusions in some not too far distant but later date.

CHAIRMAN STEIN: Do you want to call the three people? I don't know that you can make a determination on that until we hear what the other people are going to say. At least I wouldn't be able to make such a determination. It may be apparent at the end of the day tomorrow. But I wouldn't know what the conclusions will be. The Federal people may have one view. You may have another. The State of Ohio may have an entirely different view from your state. And it may not make much difference when the conclusions are reached, just so long as we record what the respective views are.

On the other hand, there may be a reasonable chance for an area of agreement in the large segments of the reports that are given and in the appraisal of the situation. And until the Federal people have given that, I don't know how close or how far apart we will be. I think the representatives will understand your point of view and your desire on that, and I think when the time comes the other conferees will be able to assist us in making this decision.

DR. WILBAR: All right. I would like to introduce the Mayor of the City of New Castle, Pennsylvania, Mr. John Jordan, who has a statement to make on behalf of the City of New Castle.

MAYOR JORDAN: Thank you very much, Dr. Wilbar. My name is John C. Jordan, I am the Mayor of the City of New Castle, Lawrence County, Pennsylvania.

Mr. Stein, Dr. Arnold, Dr. Wilbar and conferees, ladies and gentlemen: The hour is late and Dr. Wilbar has certainly summed up his position of the State of Pennsylvania which certainly includes the City of New Castle, so I will be very brief and I can state very simply in a brief way the position in regard to the pollution of the Mahoning River so far as the City of New Castle is concerned.

I was most gratified as all people in New Castle have been of the recent completion of the Youngstown sewage treatment plant. This certainly is most appreciated and gratifying to us in New Castle.

As Mayor Schryver said, he had no problems since he was upstream and Mayor Flask said he had very few problems because he was downstream. Maybe that's why I have so many serious problems because I am downstream from both of them.

But very seriously, I can say that the New Castle plant discharges on the Mahoning River about one-half mile upstream from its mouth and currently serves 55,000 people and currently was designed to serve somewhere in the neighborhood of 65,000. However, the Sanitary Water Board recently granted a permit to the City of New Castle treatment plant to improve treatment facilities. New plants have been designed to provide intermediate treatment for a 1980 anticipated population of 90,000.

Because of the design of the plant, it provides for complete treatment of sewage for approximately 45,000 people. The plant will be capable of providing treatment approaching complete treatment for a number of years. As the waste loads increase, naturally efficiency will decrease to a minimum of 65 percent B.O.D. removal at the designed population maximum of 90,000.

I am happy to report that we will open bids for a $3,700,000 sewage treatment facility this coming Wednesday and anticipate construction in late March or early April.

And I think I can sum it up very well by saying that if the taxpayers of the City of New Castle, as the people -- the taxpayers of the City of Youngstown have faced their responsibilities in the pollution of the Mahoning, we only see fit that this is reasonable and just to assume that others will face their responsibilities as well.

Thank you very much.

CHAIRMAN STEIN: Are there any comments or questions? If not, Dr. Wilbar.

DR. WILBAR: Thank you very much. Mayor Jordan. I next call on Mr. Seth Myers. He has been active Nationally in state and wildlife affairs. He is Chairman of the National Wildlife Federation of the Pennsylvania Federation of Sportmen's Clubs. He lives in Pennsylvania near the Ohio boarder and he is representing the Pennsylvania Federation of the Sportmen's Clubs today.

MR. MYERS: Mr. Chairman, gentlemen, I think the worst thing that happens in America is for a people not to be fully informed on what is being done. I have gathered data here today which I believe the people of Pennsylvania had in their possession prior to a meeting on January the 24th, they would have given outdoor recreation a little more consideration.

I think nearly everyone is interested in the outdoor recreation future and those people over there look at Mahoning River coming into Pennsylvania and they are most unhappy. Back some years ago, I was President of the Pennsylvania Outdoor Writers Association and I was asked to secure a speaker and, at that time, the Sports Afield magazine had assigned a very good friend of mine from Philadelphia, Bill Wolfe, famous author, to tour the entire United States and do a series of articles on the running sewers of our land. Perhaps some of you read them. They ran for 10 issues; later became a book which can be bought. And I asked Bill Wolfe to be the speaker at a convention in Harrisburg and he came and at the -- during the talk, he made the statement at that time that the Mahoning River was the worst polluted stream that he found in the United States. It was at that time so filthy and so loaded -- and this was 1950 -- it was so loaded that it did not freeze all winter and I am not sure that it freezes over now. From the appearance of it and from what our outdoor recreation people have told us, it still is polluted.

I have been introduced here. My name is Seth L. Myers of Sharon, Pennsylvania. I am the duly elected representative to the National Wildlife Federation of the Sportmen's Clubs, Inc. I am authorized to speak on behalf of our 724 affiliated clubs with a total membership of 136,427 paid up members in 1964 with regard to the enforcement of the Federal Pollution Control Act in the Mahoning River which flows into Pennsylvania from the State of Ohio.

People in Pennsylvania are well aware of the pollution of the Mahoning River, for many years have exerted every possible effort to having the destruction causes of the condition corrected without any real success. And, as I say, I repeat we did not know of your all-out effort here,none of the delegates present at this convention knew of it, and I certainly didn't, and I live just 14 miles from here in Sharon. I knew there was an effort being made to the extent that I have heard, the data presented here today, mighty few people in Pennsylvania outside of the Honorable Charles Wilbar knew.

As Secretary of Health he was in a position to know that a major attempt was being made but again we did not get that out, and had there been news releases sent out, I think possibly the local people here might well issue some authentic news releases and authentic data which the

Youngstown Sheet and Tube Vice President presented today. That is a marvelous program which mighty few people heard of and I think it is important.

The statewide federation has been petitioned by its Lawrence County Council affiliate to use every honorable approach in this final effort to clean up this most unbearable violation of the said Federal Water Pollution Control Act, and by unanimous vote of its membership at a meeting on January 24, 1965, authorized me to present this statement before this hearing in Youngstown, Ohio, on this 16th or 17th day of February, 1965.

Just one or two more comments I would like to make. This is not directed at Ohio or the effort that has been made here, but the National Wildlife Federation has, for 25 years, 26 years, felt that pollution of the public waters cannot be controlled through state legislation; it must be done from the Federal level. There have been many, many conservationists who have plugged for that. They have fought to have this law passed in the Congress and, incidentally, our wonderful Michael Kirwan voted for this law, and I see no reason why the law doesn't apply everywhere in the continental United States.

I just wanted to make those comments for the million sportsmen in Pennsylvania and for the 12 million citizens in Pennsylvania.

CHAIRMAN STEIN: Thank you very much, sir.

Are there any comments or questions? If not, Dr. Wilbar.

DR. WILBAR: Mr. Chairman, the Pennsylvania Division of the Isaak Walton League will file a statement for the record.* It will not present it. We have only one other statement to be made on behalf of interests in Pennsylvania in this area and this will be by Mr. Samuel McBride, manager of the Beaver Falls Municipal Authority, but his is somewhat longer and he has another dinner meeting tonight so he has asked to be put on tomorrow instead. And so with his presentation tomorrow, this will conclude Pennsylvania's part of the presentation at this conference, and I want to thank Dr. Arnold and Ohio for yielding to Pennsylvania so that we may get our presentation in.

CHAIRMAN STEIN: May we now see if we can call on Mr. J. J. Sullivan, Chief Engineer of the Community Facilities Administration.

MR. SULLIVAN: Mr. Chairman, ladies and gentlemen, I hope I can be as brief as Mayor Jordan was. Basically, Robert C. Weaver of the Highland Home Financing Agency requested me to present this information to this conference.

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* Mr. Cutright, President of the Ohio Division, Sir Isaak Walton League, will not submit statement.

The Highland Home Finance Agency through the Community Facilities Administration has worked through the Department of Health, Education, and Welfare to supply loan funds for public utility or public facility projects. If any of the communities involved need financing, we are prepared to help them. Also, we have a program of advance banking whereby communities may take advantage of our program and prepare plans for community facilities. These programs have certain requirements but the basic thing is that 50,000 population or less, a community of that size may band with other communities under authority and be eligible for loan funds under our programs.

The address for this area is our Housing Home Financing Agency, 360 North Michigan Avenue, in Chicago, Illinois.

Thank you very much.

CHAIRMAN STEIN: Thank you very much, Mr. Sullivan. Are there any comments or questions?

We do have two letters here and I would just file them for the record to appear in the record as read and the conferees can read them or, if you wish, I would read them here.

One is from the State Conservationist, Raymond S. Brown of Columbus, Ohio, addressed to Mr. Poston, and the other letter is from the Manager-Director of the Youngstown

Merchants Council. Now, I would recommend that these letters be inserted in the record at this point and the conferees can read them and, if you want, at any point for these to be read aloud, I will be happy to do that tomorrow morning.

(The letters referred to are as follows):

311 Old Federal Building, Columbus, Ohio 43215

February 15, 1965.

H. W. Poston, Regional Program Director
Water Supply and Pollution Control
Department of Health, Education and Welfare
433 West Van Buren Street, Room 712
Chicago, Illinois 60607

Your Reference: WS&PC

Dear Mr. Poston:

We appreciate the opportunity to attend the conference on the pollution of the waters of the Mahoning River and its tributaries. The interest and responsibility of the Soil Conservation Service, United States Department of Agriculture, in the control and prevention of the pollution of these waters are in the area of erosion control and prevention of sedimentation.

The Soil Conservation Service provides technical assistance to land owners through local soil and water conservation districts for the planning and application of conservation measures which help control erosion and reduce the amount of sediment reaching the streams. Soil and water conservation districts in this basin in both Ohio and Pennsylvania have active programs at this time. The Soil Conservation Service also administers the Watershed Protection and Flood Prevention Act (PL 566). However, no applications for assistance have been received for any part of the Mahoning River Watershed. Such projects can be effective in controlling sediment and in limiting areas affected by sediment-laden flood waters.

As interst and action increase in the control and prevention of pollution in the waters of the Mahoning River and its tributaries, the Soil Conservation Service stands ready to participate in every way possible.

Sincerely yours, Raymond S. Brown, State Conservationist.

Youngstown Merchants Council, 125 West Commerce Street, Youngstown 3, Ohio, February 16, 1965.

U.S. Department of Health, Education, and Welfare, Public Health Service, Region V, Chicago, Illinois.

Re: Statement on Quality of Interstate Waters -
Mahoning River, Ohio - Pennsylvania

Gentlemen:

It can be truthfully said that the retail merchants of this area fully back the program of everyone, including our governmental agencies, to strive for and effect maximum preservation and beautification of our natural resources, rivers, forests and all for our pleasure, recreation, enjoyment, etc. They, however, are businessmen and well aware that in the early stages of our industrial development and expansion, many major industries established themselves on the banks of our rivers, because of the need for water as water, water for drainage, and even water for transportation. This movement by industry to water still continues, whether it be to lakes, waterways or the seas.

Yes, the Mahoning River is now still a dirty river even though many recent major programs have gone far to reduce pollution. We feel that given ample time and with help, our industries and communities will anxiously and sincerely work toward the goal of having our river pollution minimized to a more than satisfactory condition. However, it must be kept in mind that this valley comprises the heart of the steel industry, that the Mahoning River is a so-called aqueduct, not a river in the true sense of a river, so recognized by our Government as a means of supplying sufficient cool water to the steel plants on a continuing flow basis, and also as an exit aqueduct to take out hot water and the drainage residues of these plants.

The water storage reservoirs, such as Berlin Dam, Mosquito Creek Reservoir and the West Branch Reservoir, built by our Federal Government to provide the necessary cool water during the summer months and dry periods to our steel plants, have also been planned to provide our beauty and recreation spots.

We ask that much consideration and practical thinking be given to this worthy program of non-pollution, beautification and recreation for which all of us strive, and that our badly needed industries are not impaired in their operations as these non-pollution programs are effected.

Respectfully submitted, (Signed) Carl M. Wolter, Managing Director.

- - -

CHAIRMAN STEIN: With that, I think we will stand recessed until 9:30 tomorrow morning, the same room.

(Whereupon, at 6:30 p. m., the conference in the above-entitled matter was adjourned until 9:30 a. m., Wednesday, February 17, 1965.)

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